

बच्चों के लिए
राज्य स्तरीय विज्ञान, गणित एवं पर्यावरण प्रदर्शनी-2013-14
तथा
41वीं जवाहरलाल नेहरू राष्ट्रीय विज्ञान, गणित एवं पर्यावरण
प्रदर्शनी-2014

प्रदर्शों तथा मॉडलों को बनाने के लिए एवं
प्रदर्शनियाँ आयोजित करने हेतु

दिशानिर्देश

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION
FOR CHILDREN-2013-14**

and

**41ST JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND
ENVIRONMENT EXHIBITION FOR CHILDREN-2014**

GUIDELINES

**FOR THE PREPARATION OF EXHIBITS AND MODELS, AND
Organising Exhibitions**

विद्यया ऽ मृतमश्नुते



एन सी ई आर टी
NCERT

**राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING**

CONTENTS

1.	GUIDELINES FOR THE PREPARATION OF EXHIBITS AND MODELS	3
2.	GUIDELINES FOR ORGANISING ONE-DAY SEMINAR	8
3.	GUIDELINES FOR ORGANISING STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN-2013-14	9
•	OBJECTIVES	9
•	CALL FOR ENTRIES	9
•	SCREENING, EVALUATION AND MONITORING OF ENTRIES FOR SLSMEE	11
•	CRITERIA FOR EVALUATION OF EXHIBITS IN SLSMEE	13
•	CRITERIA FOR EVALUATION OF EXHIBITS FOR JNNSMEE	13
•	EXPENDITURE NORMS	15
4.	PROFORMAS	17
•	MAINTENANCE OF ACCOUNTS	17
•	INFORMATION ABOUT PARTICIPATING SCHOOLS	18
•	INFORMATION ABOUT NATURE AND NUMBER OF EXHIBITS DISPLAYED	19
•	PANEL OF JUDGES AREA-WISE	20
•	INFORMATION ABOUT THE EXHIBIT/MODEL	21
5.	EXEMPLAR WRITE-UPS OF EXHIBITS DISPLAYED IN THE 39 TH JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN-2012 (SILVASSA, DADRA AND NAGAR HAVELI)	23

1 GUIDELINES FOR THE PREPARATION OF EXHIBITS AND MODELS

INTRODUCTION

All children are naturally motivated to learn and are capable of learning. They are natural learners and knowledge is the outcome of their own activity.

Children learn through interaction with the environment around, nature, things and people—both through actions and through languages. They construct knowledge by connecting new ideas to their existing ideas based on materials/activities presented to them. In order to stimulate creativity, inventiveness and the attitude for innovation in science and mathematics, National Curriculum Framework-2005 emphasises on activities, experiments, technological modules etc. It also encourages implementation of various activities through a massive expansion of channels such as organisation of science, mathematics and environment exhibition at the national level for school students, with feeder events at school/block/tehsil/district/region/state levels. The objective must be to search and nurture inventive/creative/innovative talent among students. The curriculum framework further envisages the upgradation of current activity in this regard by many orders of magnitude, through coordination of state and central agencies, NGOs, teacher associations etc., financial support and mobilisation of experts in the country.

Science and Mathematics are powerful ways of investigating and understanding the world. Concerns and issues pertaining to the environment should be given importance on all possible occasions through a wide range of activities involving outdoor project works. Such projects may then get a place for display in various science, mathematics and environment exhibitions.

The National Council of Educational Research and Training (NCERT), New Delhi organises Jawaharlal Nehru National Science, Mathematics and Environment

Exhibition (JNNSMEE) for Children every year for popularising science, mathematics and environmental education amongst children, teachers and public in general. This exhibition is a culmination of various exhibitions organised in the previous year by the States, UTs and other organisations at district, zonal, regional and finally at the state level. Selected entries from all States and Union Territories, the Kendriya Vidyalaya Sangathan, the Navodaya Vidyalaya Samiti, Department of Atomic Energy Central Schools, CBSE affiliated Public (independent) Schools and Demonstration Multipurpose Schools of Regional Institutes of Education participate in this national level exhibition. Like in the past several years such exhibitions are to be organised from district to state level during 2013 - 14 too. These would form the first phase of preparation for the JNNSMEE to be organised in November 2014.

Children are naturally inquisitive and innovate in response to a variety of problems in their environment. It is high time that innovations made by children are recognized and encouraged thereby solving problems confronting the nation. To encourage innovations, the Theme for the State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children – 2013-14 would be **Scientific and Mathematical Innovations**.

Recognizing the importance of innovations, the Government of India has declared the decade 2010-2020 as the **Decade of Innovations** with a focus on inclusive growth. Innovation need not always be a scientific invention or discovery which are based on high input R&D. Innovation in this context may be referred to as renewing, changing or creating more effective processes, products, ways of doing things or development of new values through solutions that meet new requirements. There are various problems related to agriculture, industry, global

warming, resource depletion, energy resources, pollution, health, nutrition, transport and communication, disaster management, environment etc. Children need to be aware of such situations, issues and problems that the society is facing and try to find innovative ways based on their scientific knowledge and mathematical understanding, to tackle them.

Children need to be encouraged to appreciate and participate in the responsible use of science and technology for the benefit of the society. They should also have a scientific vision about different issues and the ability to acquire and process information about scientific developments and innovations.

The main objectives of the exhibitions are:

- to provide a forum for children to pursue their natural curiosity, innovation and inventiveness to quench their thirst for creativity;
- to make children feel that science and mathematics are all around us and we can gain knowledge as well as solve many problems by relating the learning process to the physical and social environment;
- to lay emphasis on the development of science and mathematics as a major instrument for achieving goals of self-reliance and socio-economic and socio-ecological development;
- to analyse how science and mathematics have developed and are affected by many diverse individuals, cultures, societies and environment;
- to appreciate the role of science in meeting the challenges of life such as climate change, opening new avenues in the area of agriculture, fertiliser, food processing, biotechnology, green energy, disaster management, information and communication technology, astronomy, transport, games and sports etc.
- to create awareness about environmental issues and concerns and inspire children to devise innovative ideas towards their mitigation.

In order to facilitate the preparation of exhibits and models for display in SLSMEE-

2013 -14 and JNNSMEE-2014, the Theme for SLSMEE-2013-14 will be **Scientific and mathematical Innovations** pertaining to the areas such as-

1. Agriculture;
2. Energy;
3. Health;
4. Environment;
5. Resources;

(Areas listed above are suggestive, students are free to choose any other areas and develop exhibit involving scientific and mathematical innovations)

A few exemplar ideas pertaining to some of the areas in the context of the theme for the development of exhibits are given below.

THEME: SCIENTIFIC AND MATHEMATICAL INNOVATIONS.

1. Agriculture

The main aim of this area is to make our school children and teachers realize the need of studying and removing constraints responsible for inadequate knowledge about rural professions and building capacity and an attitude for innovation for achieving food security.

The exhibits/models in this area may pertain to:

- Studies of climatic change on agriculture;
- Managing crop yield due to climatic change arising from global warming;
- Eco-forestry to protect and restore ecosystem for sustainable forest practices/preserving and enhancing forest biodiversity;
- Preservation and conservation of soil and judicious use of water;
- Conventional biotechnology, practices e.g., application of biotechnology, microbiology, genetic engineering and genomics to agriculture for obtaining improved and high yielding varieties;
- Organic farming/organic fertilisers versus chemical fertilisers; biodynamic liquid manure/green manure;

- Planning and managing energy crops (Salix, poplar, Jatropha, Jojoba etc.);
- Use of biotechnology for economically and ecologically sustainable biofuels;
- Environment friendly measures of pest control;
- Application of biotechnology and genetic engineering in improving animal breeds and production of animal products that are used as food;
- Growing fodders in hydro-ponic environment;
- Innovative/inexpensive/improved/indigenous technologies/ methods of storage/preservation/conservation/transport of agricultural products and food materials;
- Innovative/improved practices for reducing cost of cultivation;
- Growing plants without seeds;
- Identification of medicinal plants and their applications;
- Effect of electric and magnetic fields on the growth of plants and protective measures;
- Sugar levels in plant sep at different times and dates;
- Gentic variations among plants;
- Factors affecting seed germination;
- Best conditions for mushroom production and growth of ferns;
- Tropisms in plants and growth hormones etc.;
- Indigenous designs of farm machinery, agriculture implements and practices;
- Impact of pollution on food;
- Application of biotechnology and genetic engineering to agriculture for improved and high yielding varieties;
- Improved/improvised method of processing, preservation, storage and transport of animal products;
- Ecologically sustainable farming methods;
- Harnessing of animal products keeping environmental concerns;
- Identification of medicinal plants and their applications;
- Schemes/designs to help reduce production cost and conservation of raw materials;
- Plans for proper management of natural resources and environment;
- Strategies to eliminate food insecurity;
- Issues related with the animal health and food security;
- Food production and demand of quality food and food security;
- Advantages and disadvantages of genetically modified (GM) food;
- Nutrition education/healthy eating habits and food utilisation by body;
- Pepping/mulching for weed management and root development in soil; etc.
- Devices to control and measurement of the noise, air, soil, water pollution;
- Preservation, conservation and management of soil;
- Analysis of soil samples for their components;
- Ecological studies of plants and animals;
- Experiments with biodegradability;
- Study and recording varying water levels, over the years in the water body and surrounding environment;
- Design and development of an automatic weather recording device;
- Ozone destruction experiments; etc.

2. Energy

This area is expected to make children think of various ways and means for making efficient use of available energy resources and also new techniques/methods of using and conserving energy from both conventional and non-conventional sources. The exhibits/models in this area may pertain to:

- Various ways of harnessing geothermal energy such as energy from hot springs/ geothermal desalinization/geothermal heating – controlling heating and cooling of a building using underground heat by vertical/horizontal loops/geothermal power/electricity generated from naturally occurring geological heat sources;
- Models of green building/environment friendly building which can harvest energy, water and materials;
- Green roof technologies/roof mounted

solar technologies such as solar water heater, solar lighting system;

- Heating system of a building by solar heater;
- Models/innovative designs of domestic hydroelectric generator;
- Devices to make breeze funneling towards your home;
- Methods of heat retention in materials/heat control in the design of house;
- Solar cooker/solar distiller/solar dryer for food processing/solar heated houses;
- Solar thermal electricity/community solar project;
- Innovative designs and installation of solar tower;
- Hybrid solar lighting (solar illumination by routing daylight into the interior part of the building by reflecting a focused beam of sunlight on the end of optical fiber cables);
- Studies of variation in sunshine intensity at a given place for developing indigenous method of its usage etc;
- Projects for measuring availability of solar/wind energy in a given area;
- Model of wind turbine for domestic use with vertical/horizontal axis;
- Designs of low noise wind farm;
- Wind mill/water mill for grinding grains/drawing water from the well and to generate electricity;
- Water sensitive urban design to mitigate water shortage;
- Water crisis management;
- Use of tidal waves/ocean currents/salinity gradient for generating electricity;
- Wave energy from oscillating water conversion/tidal barrage generator etc;
- Energy from biomass such as seaweeds, human/animal wastes, keeping in view environmental concerns;
- Improvised technologies for effective usage of bio-fuels;
- Innovative designs of bio gas/bio mass plant;
- Bio diesel from plant oils (obtained from canola, palm oil, micro algae oil, waste vegetable oil etc);
- Low cost liquid fuel (bio-ethanol, bio-methanol from cellulose biomass by

improvising conversion techniques);

- Bio energy for poverty alleviation;
- Impact of bio-energy on food security;
- Models/designs of fuel-efficient automobiles/machines;
- Innovative designs of internal combustion engine which can function on various bio fuels;
- Production of electrical energy from mechanical energy/nuclear resources;
- Mechanism of extraction, storage and processing of fossil fuels,
- Study of air tides;
- Effects of landscaping and architecture on energy consumption etc.

3. Health

The main objectives of this area are: to bring awareness among the youth about health and factors affecting our health, to explore new scientific, technological and bio-medical interventions in prevention and cure, to analyze the role of self and society in keeping our environment healthy in order to maintain good health and promote innovative ideas for better management.

The exhibits and models in this area may pertain to:

- Models demonstrating various levels of good health and ill health;
- Demonstration of factors affecting the health, different ailments in the body;
- Showing and designing activities on infectious and non-infectious diseases, relationship with causative factors and their sources;
- Innovation to develop control measures at different levels/roles of various agencies;
- Presenting medical assistance and facilities, rural/urban and gender aspects;
- Sensitising people to be careful in health matters, explore the possibilities and make use of the facilities available;
- Development of knowledge-base and understand new scientific, technological aids in bio-medical area;
- Demonstration of means and ways to adopt methods for self concentration and meditation and their uses;

- Demonstration of known facts and research findings in different medical systems like Indian, Modern, Homeopathy etc.;
- Demonstration of lifestyle and relationship with good and bad health based on known facts and researches;
- Demonstration of the role of traditional knowledge of herbal products for community health; etc.
- Improved methods of sanitation and appropriate technology for waste disposal, both biodegradable and non-biodegradable;
- Common prophylactic measures available and advantages of inoculation and vaccination;
- Need for appropriate measures for family welfare;
- Need for developing low-cost nutritious food;
- General awareness about occupational hazards and innovative techniques to overcome them;
- General awareness about community medicine;
- New medical diagnostic and therapeutic tools;
- Improved aids to visually impaired and physically handicapped persons;
- Need to curb menace of alcohol consumption, drug addiction and smoking;
- Genetic studies;
- Studies of memory span and memory retention; and
- Factors affecting the enzymes' reaction rates etc.
- Developing simple technologies for diagnostics and environmental problems monitoring.

4. Environment

The main objective of this area is to make general public and children in particular aware about the current environmental issues and concerns for achieving sustainability to prevent the effect of environmental issues. The models and exhibits in this area may pertain to:

- Environmental issues related with human activities such as agriculture, energy, fishing, forests, mining, shipping, paper, war, ocean deoxygenation, dead zone, paint etc.;

- Environmental issues with conservation — species extinction, pollinator decline, coral bleaching, Holocene extinction, invasive species, poaching endangered species etc.
- Environmental issues with energy conservation, renewable energy, efficient energy use, renewable energy commercialization etc;
- Environmental controversies such as dam controversies, genetically modified organisms/food controversy, sealing, dioxin controversy, water fluorination controversy, Endosulfan controversy, POP etc.;
- Environmental disasters such as Bhopal disaster, oil spills, nuclear accidents etc.
- Endocrine disruptors;
- Climate change — global warming, greenhouse gases, fossil fuels, sea level rise, ocean acidification etc.;
- Issues related with environmental health such as air quality, asthma, electromagnetic radiations and fields, lead poisoning, indoor air quality etc;
- Ozone depletion – CFC;
- Environmental effects of intensive farming such as overgrazing, irrigation, plasticulture, pesticides etc.;
- Water pollution — acid rain, marine pollution, Ocean dumping, eutrophication, marine debris, thermal pollution, algal boom, micro-plastics etc;
- Air pollution — smog, ozone, particulate matter, sulphur oxide etc;
- Light, noise, visual, point source and extended source pollution;
- Urban sprawl, habitat fragmentation, habitat destruction;
- Soil erosion, soil contamination and salination, and Waste;
- Aviation and environment;
- Environmental impacts of irrigation, dams and reservoirs;
- GAIA hypothesis and environment protection;
- Environmental implications of nanotechnology (nano-toxicology and nano-pollution).

2 GUIDELINES FOR ORGANISING ONE-DAY SEMINAR ON

Mathematics of Planet Earth – 2013

NOTE: *The One-Day Seminar should preferably be organised one day before the organisation of State Level Science ,Mathematics and Environment Exhibition (SLSMEE) for Children.*

The importance of Mathematics has been realized since ancient time. Mathematics not only helps in day-to-day situations but also develops logical reasoning, abstract thinking and imagination. It enriches life and provides new dimensions to thinking. The struggle to learn abstract principles develops the power to formulate and understand arguments and the capacity to see inter-relations among concepts. From Medical Technology to Economic Planning, from Genetics to Geology, mathematics has left an indelible mark on every part of modern Science. It can thus be seen that mathematics is a powerful way of understanding the world.

Having realized this the international mathematics community decided to dedicate the year 2013 as the 'Year of Mathematics' and mooted the idea of Mathematics Of Planet Earth (MPE)-2013. More than a hundred scientific societies, universities, research institutes and organisations all over the world have come together to make attempts to explore the mathematical framework in Nature and to see how with the help of other disciplines mathematics can provide solutions to the challenging problems on the planet earth. The ideas generated and the initiatives thought during MPE-2013 are likely to make an impact on the society in such a way that a new generation of motivated researchers will grow up to explore the mathematics in the scientific problems that relate to sustainability of planet earth.

MPE-2013 intends to create awareness among teachers, teacher educators, researchers and students about looking for mathematics in all possible situations on the planet earth. It may also motivate the community to appreciate and join interdisciplinary courses in future.

During the Year of Mathematics of Planet Earth activities are planned to (i) increase the public appreciation and understanding of Mathematics; (ii) generate awareness among the masses about the power of mathematics; (iii) motivate people to think about using mathematics for solving challenging problems surrounding them; and (iv) make people aware of the aesthetic sense and beauty of mathematics.

As a part of this endeavour, to reach out to the public through children, a one day seminar may be organised in the SLSMEE for children. During this One-Day Seminar on Mathematics of Planet Earth, children, teachers, parents and all concerned may be invited to generate ideas. The activities in this seminar may include:

- Encouraging the designing of projects in mathematics to generate enthusiasm in the recent trends of development and research in mathematics;
- Making people aware of contributions of mathematics in the development of other subject areas;
- Publicising the usefulness of mathematics in the development of mankind in bringing it to the present stage;
- Organising poster exhibition-cum-competitions highlighting usefulness of mathematics, especially when it is worked out with other disciplines, in solving the problems on planet earth;
- Organising invited talks by experts in mathematics, particularly motivating the audience to look for mathematics in the nature;
- Arranging a Quiz competition in which questions may be based on the interdisciplinary approach to learn mathematics;
- Arranging a group discussion among different groups, to create awareness about the usefulness of mathematics in different spheres of life.

OBJECTIVES

The purpose of science, mathematics and environment exhibition is to develop scientific attitude in the young generation of our country to make them realise the interdependence of science, mathematics, technology and society and the responsibility of the scientists of tomorrow. These objectives may be achieved by presenting the exhibits as an exciting experience of creativity of children, innovations through improvisations of science and mathematics kits, and various devices and models for providing solutions to many present and future socio-economic problems particularly those confronted in the rural areas, using available materials and local resources.

The exhibition will help children and teachers to learn from each other's experiences and motivate them to design and develop something new and novel. It will also provide a medium for popularising science and mathematics; and increase awareness among the public towards it. The objectives of organising exhibitions may briefly be put as follows:

- stimulating interest in science, mathematics and environment and inculcating scientific spirit in young generation;
- exploring and encouraging scientific and technological talent among children;
- inculcating in them a sense of pride in their talent;
- making children realise the relationship between science, mathematics, technology and society;
- understanding the need for proper management for the optimum utilisation of resources and prevailing technologies;
- providing exploratory experiences, encouraging creative and innovative thinking and promoting psychomotor and manipulative skills among children through self devised exhibits or models or simple apparatus;
- encouraging problem solving approach and developing the appropriate technologies, especially for rural areas and integrating scientific ideas with daily life situations;
- inculcating intellectual honesty, team spirit and aesthetic sense among the participants;
- popularising science and mathematics among masses and creating an awareness regarding the role of science and technology in socio-economic and sustainable growth of the country;
- developing appropriate techniques for communication of science, mathematics and environment; and
- creating awareness about environmental issues and concerns and inspiring children to devise innovative ideas towards their sustenance and mitigation.

CALL FOR ENTRIES

The theme for the State Level Science, Mathematics and Environment Exhibition (SLSMEE)-2013-2014 for Children and for the 41st Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNMEE- 2014) would be '**Scientific and Mathematical Innovations**' pertaining to the areas such as -

1. Agriculture;
2. Energy
3. Health;
4. Environment;
5. Resources;

(Areas listed above are suggestive, students are free to choose any other areas and develop exhibit involving scientific and mathematical innovations)

In order to facilitate the preparation of exhibits and models for display in district to state level exhibitions during 2013-2014, *Guidelines for the Preparation of Exhibits and Models* are being communicated.

- i. Children from all schools [including

government, government-aided, public and private, catholic, mission, armed-forces (Army, Air Force, Navy, Sainik, BSF, ITBP, Assam-Rifles, CRPF, Police etc.), DAV management, Maharshi Vidya Mandir, Saraswati Vidya Mandir, Central Tibetan Schools, Navyug, Municipality, Bhartiya Vidya Bhavan, Science Clubs etc.] are eligible to participate in State Level Exhibitions. Preference may be given to students in senior classes (i.e. in secondary and higher secondary stages).

Note for all State Level Exhibitions coordinators belonging to state/UT governments:

Following organisations conduct their own exhibitions separately:

- Kendriya Vidyalaya Sangathan;
- Navodaya Vidyalaya Samiti;
- Department of Atomic Energy Central Schools;
- CBSE affiliated Public Schools (independent schools); and
- Demonstration Multipurpose Schools of Regional Institutes of Education.

These organisations send their selected entries for consideration for participation in Jawaharlal Nehru National Science, Mathematics and Environment Exhibition

(JNNMSEE) for Children to NCERT directly. Therefore, it may please be ensured that entries belonging to these organisations are not forwarded to NCERT by States/UTs.

- ii. Wide publicity should be given for inviting entries. *Guidelines for the Preparation of Exhibits and Models for display in district to state level exhibitions during 2013-2014 should be provided to all schools.* These guidelines may also be translated in local languages, if possible, and be given wide publicity. This may also be given on the Internet website(s) of the respective states/ union territories and other participating organisations. It is also envisaged that guidelines be printed in local language(s), Hindi and English in the form of a booklet for their dissemination among all the schools for generating ideas and for developing exhibits and models. These guidelines can also be downloaded from NCERT website (www.ncert.nic.in).
- iii. Public Sector Undertakings, Industries, and other Non-government Organisations working in the areas (where these exhibitions are organised) may also be invited to participate as the exhibits displayed by them would be of instructional value for children and teachers.

SCREENING, EVALUATION AND MONITORING OF ENTRIES FOR SLSMEE

1. A Screening Committee should be set up to finalise the selection of entries from various institutions for participation in the State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children in case Districts/Regional Level Exhibitions are not being organised by the state/UT.
2. The Screening Committee may consist of representatives of SISE/SIE and some selected representative institution(s). All records about the meeting of the committee should be maintained. The selection procedure adopted should lay more emphasis on the quality of the exhibits rather than quantity. *It should be ensured that the exhibits are not crude and hazardous and have good finish and are presentable.*
3. The above mentioned Screening Committee or a separate panel of judges should evaluate the exhibits according to the criteria of evaluation mentioned herewith. Best **three - four** exhibits in each area should be selected preferably developed by secondary and higher secondary students by the said panel of judges. However the exhibits developed by upper primary students and members of science clubs may also be considered.
4. A separate list of the selected entries of the exhibits and models under each area (to be displayed in the state level exhibition) must be prepared. This must contain the name of the exhibit/model, names of the student(s) and guiding teacher(s), name of the school and a brief information about the exhibit (may be in two sentences only). This list may also be distributed

among all participating children and teachers. A copy of this list should be forwarded to NCERT together with the formal report of the exhibition.

Such a list may be prepared in accordance with the NCERT's un-priced publication "List of Exhibits", displayed in the National Exhibition. It is published every year and distributed to all participating children, teachers, and visitors during the exhibition. *A copy of this may be obtained from the NCERT, New Delhi.*

5. A formal report of the State Level Science, Mathematics and Environment Exhibition and One-Day Seminar should reach NCERT **within one month** after the conclusion of the exhibition. It should include the following:
 - i. Dates and venue of exhibition.
 - ii. Proformas I - V duly filled up.
 - iii. List of schools participating and the number of students/teachers participating as per the proforma attached. Break-up of the male and female participants should also be given. It should also reflect on the number of rural and urban schools, that participated in the exhibition.
 - iv. List of entries of the exhibits and models being displayed in the state level exhibition, as explained in paragraph-4 above. Number of exhibits displayed under each area should also be mentioned separately.
 - v. Highlights of the exhibition including other activities such as lectures, film shows, book exhibition etc. and participation of other scientific/ industrial organisations.
 - vi. Panel of judges for evaluating the exhibits/models displayed in the exhibition (in accordance with the Criteria for Evaluation of Exhibits).

vii. List of selected exhibits being sent for consideration for display in 41st JNNSMEE - 2014 bearing the name of student, teacher, school, write-up of exhibits etc.

(A proforma for information about the exhibit/model is also attached for this purpose - Proforma V).

viii. Number of visitors to the exhibition.

The Report

and

Proformas I-V

should strictly follow the above format and be forwarded

within one month

after the conclusion of the exhibition to :

R.R.Koireng

Coordinator

**State Level Science, Mathematics and Environment
Exhibition (SLSMEE) for Children - 2013-14**

Department of Education in Science and Mathematics
National Council of Educational Research and Training
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CRITERIA FOR EVALUATION OF EXHIBITS IN SLSMEE

The Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE) for Children is organised every year by NCERT. It receives entries for consideration for participation from States/UTs selected from the State Level Science, Mathematics and Environment Exhibition held in the preceding year. In order to keep a uniform criteria for evaluating the exhibits in all States/UTs and on the basis of the feedback received from different agencies, the following criteria for judging the exhibits is suggested (the percentage given in bracket are suggestive weightages):

1. Involvement of children's own creativity and imagination (20 per cent);
2. Originality and **scientific and mathematical innovations** in the exhibit/ model (15 per cent);
3. Scientific thought/ principle/ approach (15 per cent);
4. Technical skill, workmanship and craftsmanship (15 per cent);
5. Utility for society (15 per cent);
6. Economic (low cost), portability, durability, etc. (10 per cent); and
7. Presentation - aspects like demonstration, explanation and display (10 per cent)

[(i) 5% extra weightage may be given to exhibits from rural/backward regions.]

[(ii) 3% extra weightage may be given to exhibits from semi urban regions.]

It is further suggested to divide the entries into two categories, viz. (i) upto elementary stage (upto class VIII); and (ii) secondary and higher secondary stage (Classes IX - XII). On the basis of the criteria suggested above, three entries from each area may be selected and forwarded to NCERT for consideration for participation in JNNSMEE-2014. Besides popularisation of science and mathematics, the objective of this activity is to search and nurture inventive/ creative talent among children. Judges are requested to evaluate the entries on the basis of pupils' involvement. Imagination and innovations made by the child in designing the

exhibit/model should be assessed. They should also judge whether the model is traditional or an improvement over the traditional model or it is innovation. Various skills involved in constructing the exhibit and model, the degree of neatness and craftsmanship may also be taken into account. *Every effort must be made to rule out the tendency of procuring the ready-made exhibits/models.*

General layout of the exhibit, relevance, clarity of charts accompanying the exhibit and overall attractiveness to the masses and children should also be assessed. Working models should be encouraged.

CRITERIA FOR EVALUATION OF EXHIBITS FOR CONSIDERATION FOR PARTICIPATION IN JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION (JNNSMEE) FOR CHILDREN.

Selected entries from all State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children organised in different states, union territories and other organisations are forwarded to NCERT for consideration for participation in Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE) for Children. JNNSMEE is organised every year by NCERT in a state/ union territory on rotation basis usually around the birth anniversary of Pandit Nehru, that is 14th November (Children's Day). These entries are forwarded to NCERT in Proforma V (given in this booklet.) An exemplary write-up of an exhibit is also given at the end of this booklet. At NCERT, these entries are screened and short-listed on the basis of their write-ups. For this purpose the following criteria for evaluating the write-ups of exhibits is undertaken (the percentage given in bracket are weightages). NCERT reserves the right to alter the criteria to include adequate number of exhibits from rural/ backward regions.

1. Originality and innovations in the exhibit/ model (25 per cent);
2. Scientific thought/ principle/ approach (20 per cent);
3. Utility for Society ; (20 per cent)
4. Economic (low cost), portability, durability, etc. (15 per cent); and
5. Presentation of write-up: (20 per cent).

State/UT_____

Duration_____

STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2013-2014

THEME: SCIENTIFIC AND MATHEMATICAL INNOVATIONS

VENUE:

JUDGES' PROFORMA FOR EVALUATION OF PARTICIPATING ENTRIES-AREA WISE

Areas: (i) Agriculture; (ii) Energy; (iii) Health; (iv) Environment; (v) Resources.

(vi) Any other area (please specify)

(Please tick mark on the area being evaluated)

Sl. No.	Code of the Exhibit	Involvement of Children's Own Creativity and Imagination	Originality/ Innovations in the Exhibit/ Model	Scientific Thought/ Principle/ Approach	Technical Skills/ Workmanship/ Craftsmanship	Utility for society	Economic (low cost)/ Portability/ Durability	Presentation	Total
		20%	15 %	15 %	15 %	15 %	10 %	10%	100 %
1.
2.
3.
4.
5.
6.
...
...

Date: _____

Signature

Name :

Note: **5% and 3% extra weightage may be given to exhibits belonging to**

rural/backward and semi urban regions respectively.

Designation and Affiliation:

EXPENDITURE NORMS

The 'Grant-in-Aid' provided by NCERT to respective states/UTs is a **catalytic grant** for organising State Level Exhibitions and one day Seminar. States and UTs are expected to spend the additional expenditure, if any, from the state funds. The funds given to the States/UTs are to be utilised *exclusively for meeting the travel and boarding costs of participating students and their teachers and experts*. It is suggested that the following norms of payment may be followed:

1. For Organising One-Day Seminar

- (i) The seminar should be organised one day before the organisation of SLSMEE or during the days of exhibition in morning/evening hours.
- (ii) Honorarium to **four (two** outstation and two local) experts/scientists may be disbursed at the rate of Rs 1000.00 each.
Note : The expert/scientist should be preferably from a research institute/ laboratory/ university.
- (iii) Travelling allowance to two outstation experts/scientists from a maximum distance of 500 km may be disbursed as per the state/central government rules.
- (iv) Daily allowance and incidental charges to **two** outstation experts/scientists for a maximum of three days may be disbursed as per state/central government rules.
- (v) Conveyance charges to **two** local experts/scientists may be disbursed as per state/central government rules.
- (vi) Contingency grant for tea/coffee with light snacks: typing/photocopying/ cost of transparencies/transparency pens/CDs etc: Rs. 2,500.00.

2. For Organising the SLSMEE

- (i) Honorarium to **four** (local) judges may be disbursed at the rate of Rs. 1000.00 each. **NCERT faculty members**

should not be provided any Honorarium from this head, if invited as a judge in the exhibition.

- (ii) Only one student and one teacher may be permitted to participate with each exhibit. However, for more than one exhibit from a single school, only one teacher may be allowed to participate.
- (iii) Travelling allowance: actual second class sleeper rail/bus (non-AC) fare.
- (iv) Incidental charges maximum upto Rs. 100.00 for to and fro journey may be provided for the journey by rail or bus provided the journey time is more than 6 hours. For journeys less than 6 hours no incidental charges should be paid.
- (v) Boarding expenses: Rs.80.00 per head per day for each participant for a maximum of 4 days. *In case the boarding facilities are not provided by the organisers, a sum of Rs.120.00 per person may be provided as daily allowance (DA).*
- (vi) Local conveyance charges may be disbursed as per state/central government rules.
- (vii) contingency grant for typing/ photocopying etc. Rs. 2,500/-

It is necessary to **maintain a separate account** for the expenditure of the grants-in-aid provided by the NCERT and the same should be forwarded to the NCERT, along with all relevant vouchers and receipts, in original **WITHIN ONE MONTH OF THE CLOSE OF THE EXHIBITION** for adjustment in the NCERT account. Proforma I is given for convenience. All vouchers may be signed by the Coordinator/In-charge of the exhibition. All those vouchers/receipts that are in regional language should accompany a translated copy in English certified by the Coordinator/In-charge of the State Level Exhibition to facilitate audit and settlement of accounts. Only those Vouchers/Receipts against such items of expenditure, which are covered under the expenditure norms,

may please be sent to this department for adjustment/settlement of accounts. All payments exceeding Rs 5000/- should be supported by payee's receipt with a revenue stamp.

It may please be ensured that each Voucher/Receipt against the expenditure is duly verified for the amount and then passed for payment. The specimen of this certificate is indicated below for convenience:

Verified and passed for payment of Rs.(Rupees only).

Signature of the Co-ordinator/Incharge
State Level Science, Mathematics and Environment
Exhibition (SLSMEE) for Children - 2013-14

Seal .

4 PROFORMAS

STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2013-2014

Proforma I

MAINTENANCE OF ACCOUNTS

State/Union Territory: _____

Dates of Exhibition: _____

Venue of Exhibition: _____

Voucher	Receipt			Expenditure				Signature of Coordinating Officer
	Date of	Particulars	Amount	Voucher	Date of	Particulars (Head-wise)	Amount	
		Draft No. Date						
		Other income, if any						
					Balance Refunded to NCERT, if any,			
		Total				Total		

Certified that the expenditures have been made in accordance with the norms and Guidelines as given by the NCERT for organising the State Level Science, Mathematics and Environment Exhibition for Children. It is also certified that no other voucher is included.

Date

Signature of the In-Charge (Controlling Officer)
Official Seal

STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2013-2014

Proforma II

INFORMATION ABOUT PARTICIPATING SCHOOLS

State/Union Territory: _____

Dates of Exhibition: _____

Venue of Exhibition: _____

Type of School*	No. of Schools	Tribal (T)/ Rural (R)/ Urban (U)	Number of Exhibits/ Models	Participants from the School						
				Teachers			Students			
				Male	Female	Total	Boys	Girls	Total	SC/ST
G	T									
	R									
	U									
LB	T									
	R									
	U									
PA	T									
	R									
	U									
PU	T									
	R									
	U									
Total										

* **G. Government:** A Government School is that which is run by the State Government or Central Government or Public Sector Undertaking or an Autonomous Organisation completely financed by the Government;

LB. Local Body: A Local Body School is that which is run by Panchayati Raj and Local Body Institutions such as Zila Parishad, Municipal Corporation, Municipal Committee or Cantonment Board;

PA. Private Aided: A Private Aided School is that which is run by an individual or a private organisation and receives grants from the Government or Local Body;

PU. Private Unaided: A Private Unaided School is that which is managed by an individual or a private organisation and does not receive any grant from the Government or Local Body.

STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2013-2014

Proforma III

INFORMATION ABOUT NATURE AND NUMBER OF EXHIBITS DISPLAYED

THEME: SCIENTIFIC AND MATHEMATICAL INNOVATIONS

State/Union Territory: _____

Dates of Exhibition: _____

Venue of Exhibition: _____

Areas	Nature and Number of Exhibits Displayed				Total No. of Exhibits
	Innovative/Improved Apparatus/Working Model	Static Model	Study/Survey Report	Any other	
Agriculture					
Energy					
Health					
Environment					
Resources					
Any other area (Please specify).					
Total					

State/UT _____

Duration _____

STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2013-2014

Proforma IV

PANEL OF JUDGES - AREA WISE*

VENUE

THEME : SCIENTIFIC AND MATHEMATICAL INNOVATIONS PERTAINING TO THE AREAS OF

Areas: (i) Agriculture; (ii) Energy (iii) Health; (iv) Environment; (v) Resources.

(vi) Any other area (please specify).....

(Please tick mark on the area being evaluated)

Sl. No.	Name(s) of the Judge(s)	Designation	Official Address, Phone Fax, e-mail	Residential Address Phone, Mobile
1.				
2.				
3.				
4.				

* Respective judges may have their opinions, suggestions and comments about the organisation of science, mathematics and environment exhibition. NCERT welcomes all such opinions. Kindly enclose them on separate sheets.

**41ST JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION
(JNNSMEE - 2014) FOR CHILDREN**

Theme : SCIENTIFIC AND MATHEMATICAL INNOVATIONS

Proforma V

INFORMATION ABOUT THE EXHIBIT/MODEL

1. TITLE OF THE EXHIBIT/MODEL

(IN BLOCK LETTERS)

2. Area:

**Tick only one and
strike out all others)**

- (i) Agriculture
(ii) Energy
(iii) Health
(iv) Environment
(v) Resources
(vi) Others (Please specify area)

3. NAME(S) OF CONTRIBUTING STUDENT(S) _____ (M/F); Class _____
(IN BLOCK LETTERS) _____ (M/F); Class _____
_____ (M/F); Class _____
_____ (M/F); Class _____

4. NAME(S) OF GUIDING TEACHER(S) _____ (M/F)
(IN BLOCK LETTERS) _____ (M/F)

5. SCHOOL AND COMPLETE POSTAL ADDRESS (IN BLOCK LETTERS) :

.....
.....
.....State/UT.....Pin
Phone:; Email

6. Type of school* Government/Local Body/Private Aided/Private
Unaided/Any other (Please Specify)

7. Affiliation of the School State Board/ICSE/CBSE
Any other (Please Specify) _____

8. Location of the School Tribal/Rural/Backward/Semi Urban/Urban

9. Nature of the Exhibit/Model (A) Innovative/Improvised Apparatus
(B) Working/Static Model/Study Report
Any Other (Please Specify) _____

10. Whether Dark Room Space is needed for the Display of Exhibit: Yes/No

- * **G. Government:** A Government School is that which is run by the State Government or Central Government or Public Sector Undertaking or an Autonomous Organisation completely financed by the Government;
LB. Local Body: A Local Body School is that which is run by Panchayati Raj and Local Body Institutions such as Zila Parishad, Municipal Corporation, Municipal Committee or Cantonment Board;
PA. Private Aided: A Private Aided School is that which is run by an individual or a private organisation and receives grants from the Government or Local Body;
PU. Private Unaided: Private Unaided School is that which is managed by an individual or a private organisation and does not receive any grant from the Government or Local Body.

11. Source of inspiration/help for preparing the exhibit/model:

(Please explain briefly about the nature and form of help received from the following):

(i) From Teachers/School

(ii) From Parents

(iii) From Peer Group

(iv) Any other

12. Brief Summary (Please explain the purpose (or aim) and the scientific principle involved in the exhibit/model in not more than three lines).

13. Write-up of the Exhibit/Model **(not more than 1,000 words) in the following format.**

[Note: Proper submission of the write-up will ensure that if selected for participation in the 41st Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE-2014) for Children – 2014, it will be considered for publication in the booklet entitled: Structure and Working of Models. For convenience an exemplary write-up is also given in this booklet.]

I. *Introduction*

- (i) Purpose (or Rationale) behind the development or construction of the exhibit; and
- (ii) The scientific principle involved.

II. *Description*

- (i) Materials used for the construction;
- (ii) Construction and working of the exhibit/model; and
- (iii) Applications, if any.

III. *References*

Books, journals or magazines referred for preparation of the exhibit/model.

IV. *Illustrations*

- (i) Black and white line and labelled diagram of the model, illustrating the working of the exhibit/model.
- (ii) Close-up photographs of the exhibit/model.

- Note:**
- (i) Please neither pin nor paste the photographs of the exhibits. Enclose them in a separate envelope. Description of the photograph may be written on its back.
 - (ii) Please do not enclose the photographs of participating student(s) and their guide teacher(s).

(Signatures of all students and teachers)

TWO-IN-ONE HONEY SQUEEZING MACHINE

DISPLAYED IN THE 39TH JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT

EXHIBITION FOR CHILDREN-2012 (SILVASSA, DADRA AND NAGAR HAVELI)

STUDENT

Sonia Thounaojam

Sacred Heart School,
Porompat, Manipur

TEACHER

Angom Geetarani

INTRODUCTION

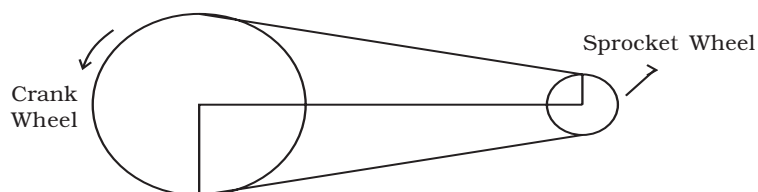
Honey is an edible natural fluid. It is a rich source of energy containing many vital nutrients. Though Manipur has nearly 10,000 bee-keepers but the honey is not appropriately produced.

In Manipur, honey is extracted from honey comb by squeezing or by rotating manually. This type of method could not extract all the honey from the honey comb. Instead it loses muscular power, contains impurities and is also a time consuming work. So, it is necessary to make a machine which can extract large quantity of honey that contains no impurities. Such type of machine is envisaged in this model. The present model is an attempt to solve the problems of using excessive muscular power while extracting honey.

SCIENTIFIC PRINCIPLE INVOLVED

The following scientific principle is involved

- (i) When a crank, connected to a sprocket wheel by a chain, is made to rotate, the linear speed 'v' is the same for both wheels.



Therefore, $v = WR = wr$, where R and r are radii of the crank and the sprocket respectively.

Hence, $w = W \left(\frac{R}{r} \right)$, 'v' is the speed and W and w are their angular speeds.

Since, $R \gg r$, $w \gg W$.

Therefore, for one rotation of the crank, there will be a number of rotations (depending upon $\frac{R}{r}$) of the sprocket wheel.

- (ii) Principle of experiencing a centrifugal force when an object is made to rotate in a direction away from the centre of the circular path.

MATERIALS REQUIRED

Wood, Stainless steel, Honey comb, Chain, Sprocket wheel, Paddle, Handle, Pot etc.

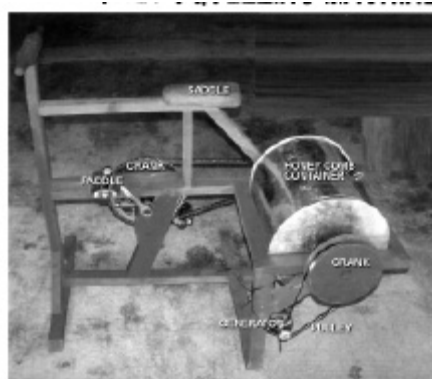
CONSTRUCTION AND WORKING

Construction

- (a) 1 honey comb keeping container.
- (b) 3 Sprocket wheels, different in size.
- (c) 1 iron rod in the middle of comb container to attach the comb.
- (d) 1 crank and 1 honey collector.

Working

When the paddle connected to the crank is rotated by hand or by the foot of a person sitting on the saddle, the sprocket wheel whose radius is 5 times (say) smaller than the crank rotates 5 times faster. The honey comb frames, connected/attached to the axle of the sprocket wheel also rotates. Because of the centrifugal force experienced due to rotational motion, the honey get separated from the honey combs due to striking of the the curve surface of the hollow cylindrical drum whose axis is kept coinciding with axis of rotation. The honey is collected in a vessel placed below the drum through the holes provided. The other sprocket wheel close to the 1st one, allows the honey comb to rotate in the opposite direction. By rotating the crank in that direction, honey will come out from the other side of the honey comb also. This helps in extraction of honey more efficiently.



ADVANTAGES OF THE MODEL

- (i) Physical exercise of the man by paddling the crank in both direction. (clockwise and anti-clockwise)
- (ii) Effective use of muscular energy in doing physical exercise.
- (iii) More production of honey from honey comb.
- (iv) Saving time both in doing physical exercise and extraction of honey.

APPLICATION

It is used to extract honey. Besides this, machine has even the provision for generating power (electricity) if a generator (d.c.) is connected to the rear rotating system and can be used as a source of light for working in dark.

VEHICULAR EXHAUST FILTER

DISPLAYED IN THE 39TH JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT

EXHIBITION FOR CHILDREN-2012 (SILVASSA, DADRA AND NAGAR HAVELI)

STUDENTS

Vaibhav Dhama
Saransh Mathur

Demonstration School,
RIE, Ajmer
Rajasthan

TEACHER

Amarendra Tripathy

INTRODUCTION

We know that many vehicles are increasing air pollution which increases global warming or the temperature of the earth. Many steps have been taken to reduce the emission level of gases coming out from the vehicle exhaust. We can see in heavy traffic areas the level of air pollution is very high. We feel uncomfortable and even feel itching in our eyes in such areas. Increasing air pollution is a danger sign for all living organisms on earth. Exhaust gases coming out from all types of automobiles contains mainly carbon mono-oxide, carbon dioxide, nitrogen dioxide, hydrocarbons, sulphur dioxide and other harmful gases. These gases are very harmful for our environment and ecological system. This project is an attempt to solve the problem of high pollution level in cities due to automobiles in heavy traffic areas. This project helps us to reduce the air pollution caused by the vehicles.

SCIENTIFIC PRINCIPLE INVOLVED

In the cooling chamber two aluminium plates which have charge on them attract dust particles. The exhaust gases pushed by the exhaust fan on the nets made of synthetic fibers and solution of sodium hydroxide (NaOH) is sprayed by the sprayer. NaOH reacts with the harmful exhaust gases and neutralizes them. This way, the level of polluted air is very low.

MATERIALS REQUIRED

Bottles of two litre capacity, T-shape water pipe joint, two exhaust fans, aluminium foil, NaOH solution, sprayer, battery, etc.

CONSTRUCTION AND WORKING

In this project the exhaust gases are collected in the cooling chamber (the shape of the cooling chamber is like a frustum) where due to the expansion of gases their temperature becomes low. In the cooling chamber there are two aluminium plates which create charge on them and attract the acidic/basic dust or harmful particles and then an exhaust fan sucks the gases and pushes the gases in NaOH treatment chamber. We can identify it in given figure (1) where the NaOH reacts with harmful gases and make them neutral. There is a machine called sprayer placed after the exhaust fan which sprays NaOH on the nets of synthetic fibers after every 2 km distance period when the vehicle is running.

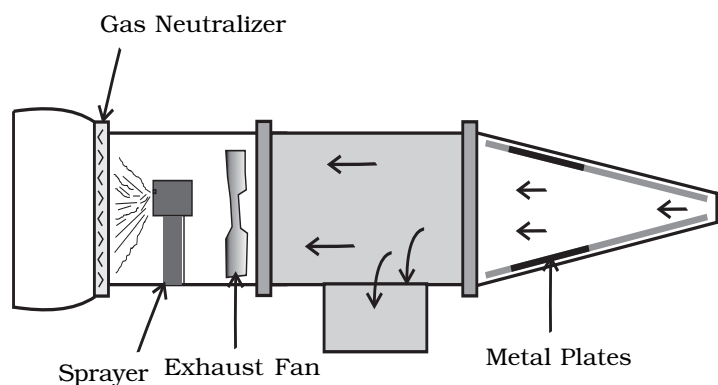


Fig. 1

In the vertical chamber the remaining dust particles are separated by exhaust fan which pushes the gases on a filter so the heavy solid harmful particles settle down. Then the remaining gases are again treated with NaOH. We can identify it in figure (2). Finally, cool and fresh air with very low air pollution comes out and spread out in the environment.

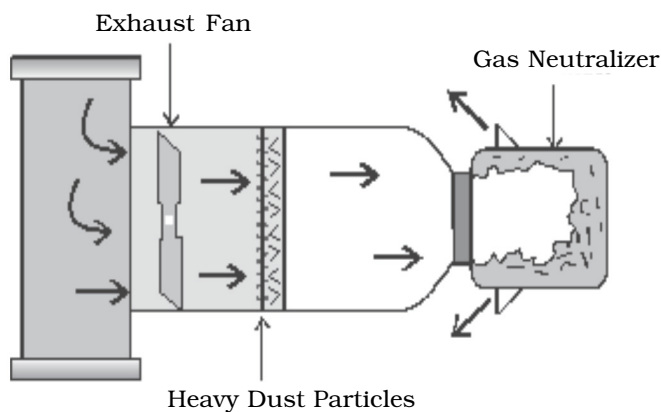


Fig. 2

Removal of harmful particles/chemicals: Take out the nets of synthetic fibers and wash them in NaOH solution to remove solid sediments and harmful chemicals periodically.

RESULT

It ensures lowering of the pollution level in air due to automobiles. So we can save our earth from pollution.