Navi Mumbai Science Foundation

EduREKA

Education for Scientific spirit

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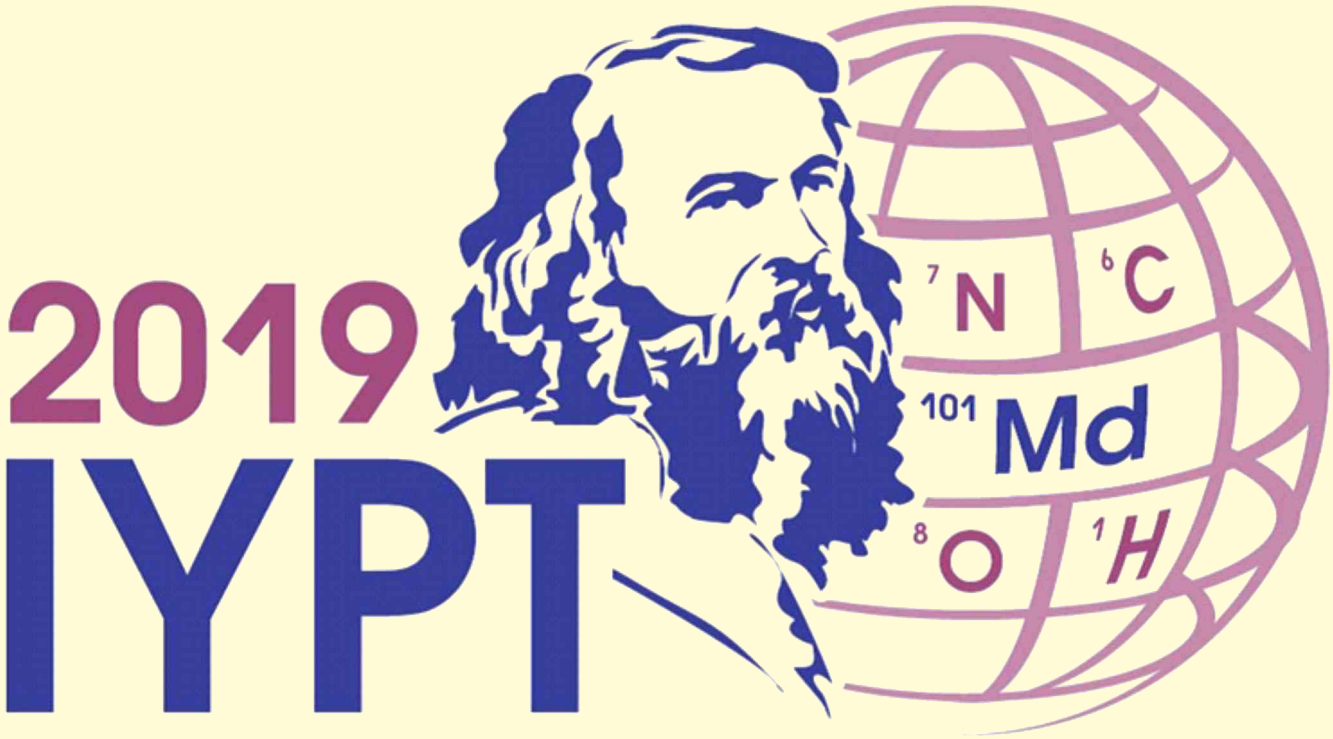

150th anniversary of periodic table creation by Russian scientist Dmitri Mendeleev

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This is a quarterly e-magazine published by Navi Mumbai Science Foundation, a society engaged in spreading science education among students of Navi Mumbai region. The magazine will cover all the activities of the society as well as articles on educating science to the students.

Contents

Image courtesy: www.**wikipedia.com**

Foreword …

Today there is an explosion of information, yet there still is an urgent need for authentic science communication for school-going students, their parents and teachers. Multiple sources of information are essential and thus I welcome the initiative of Navi Mumbai Science Foundation (NMSF) in planning an online magazine titled “EduReka” to fill the existing gap between schools and scientific developments. EduREKA aimed at bringing together the growing community of science communicators on a single platform to address school students and the associated stakeholders will fill the existing communication gap to some extent. However, the direction of science communication cannot be uni-directional; that is from experts to laypersons. Thus, I hope that this magazine will be open to contributions from students, parents and teachers as well as laypersons, and that the magazine welcomes submissions in a multiplicity of languages, allowing authors to express their ideas in any language.

The Homi Bhabha Centre for Science Education (HBCSE) has been happy to collaborate with NMSF over the past years and hopefully EduREKA will provide another avenue of fruitful association to both institutions to reach out to the education and science communication communities.

Sugra Chunawala
Homi Bhabha Centre for Science Education

From Editorial Desk

It gives me immense pleasure to present the first issue of e-magazine “EduREKA” published by Navi Mumbai Science Foundation. Idea of the magazine was there in back of our minds since long but there was a dilemma between printed version and electronic version. But this being a digital age of scientific advancement and given its intrinsic easy to use nature the electronic version conquered the race hands down.

Coming to the word EduREKA, it is an insightful combination of two words education and Eureka. The exclamation (Eureka) is most famously attributed to the ancient Greek scholar Archimedes; who reportedly exclaimed “Eureka!” when he stepped into a bath and noticed that the water level rose. He suddenly realized that the volume of water displaced must be equal to the volume of the part of his body he had submerged. Archimedes’ insight led to the solution of a problem posed by Hiero II of Syracuse, on how to assess the purity of an irregular golden votive crown; he had given his goldsmith pure gold for use in making the same and correctly suspected that he had been cheated by the goldsmith who removed some gold and added the same weight of silver. Equipment for weighing objects already existed and now that Archimedes could also measure volume, their ratio would give the object’s density, an objective indicator of purity of gold (The Architecture by Vitruvius).

Navi Mumbai Science Foundation is engaged in spreading the science education among students for last one decade and has emerged as a leading organization in this field. Thus the name truly reflects the function of the organization as well as its activities in the sphere of educational field. Logo “EduREKA” also depicts the coherence and interconnectedness of all major fields of science which includes physics, chemistry and biology.

I hope the scientific community, educationists, scientists and students will welcome our idea and help spread the spirit of scientific temperament in society.

….. Editor

Navi Mumbai Science Foundation (NMSF): A Decade of Scientific Journey

For an NGO like NMSF, a decade may be too small a period to be meaningful on geological time scales. In comparison to human life span, however, it just cannot be ignored. Its significance becomes all the more meaningful when the reference is made to the first decade of existence of any institution. The pangs of birth, though metaphorical, cannot be brushed aside. Then followed the toiling years of upbringing and so on; all this finally received the due recognition in society to which its services are meant for. There lies a sense of achievement when its worth is found to be more than its weight in Gold or shall I now say Platinum.

Well, NMSF too had a similar destiny. It faced questions as to why there is a need for its existence, what role it will assign itself, where it will fit into the spectrum of societal needs, and so on. Finally, what would be its philosophy which will ensure that its services meet the societal needs of the day while guaranteeing its own survival as a mature organization in decades that are to follow.

The appropriate philosophy was then to involve only those individuals who i) will be active stakeholders of the organization right from day one and ii) will also be constantly in search of new scientific activities as and when they can be accommodated. It is this singular parameter which has served the organization in good stead. Some of the original members had to leave the organization for personal reasons. But their goodwill is still with NMSF. Their place has been filled in due course by individuals who are not only equally dedicated but are more youthful and also bubbling with enthusiasm. This has been adequately reflected in the growth of scientific activities over the years – from 3 in the beginning to 10 now. This particular venture of bringing out an e-magazine is the latest example of NMSF's desire to keep exploring and evolving. All this goes a long way to prove beyond doubt that "a group of dedicated volunteers" with an identical goal will more than suffice to ensure fruitful survival of the organization. Further, the activities have been focused mainly to address the needs of students in the age group of 10 to 17 years – the most formative years of any one's life. The Foundation's anticipated role and achievements are briefly summarized under the head "About NMSF" which follows next.

Navi Mumbai Science Foundation (NMSF) is a science led NGO located in Navi Mumbai, which is dedicated to development of "scientific temperament" in society in general and the student community in particular. From this point of view, it primarily plans scientific activities that involve student community of the age group 10-17 years. This in turn will contribute towards a holistic development of the nation and prepare it to face the challenges posed by a technologically advancing global environment without losing sight of its societal commitments. Though its services are presently confined to Navi Mumbai area, they are well set to expand to adjoining areas in times to come.

This NGO was established in the year 2007. The rapid growth in its scientific activities and committed volunteer support base in the next two years of its existence enabled the NMSF to proceed with its formal registration at the office of Charity Commissioner, Thane. The procedure did not take very long and NMSF received its Society Registration no."Maha/2592/10/(Thane)" in the year 2010, and Bombay Public Trust Registration. No."F/24093/Thane" in the year 2012.

The Foundation's envisioned role in the societal canvas and its achievements are briefly summarized as follows:

VISION

- Kindle and nurture scientific temperament in students;
- Enhance soft skills like problem-solving approach and communication skills;
- Promote 'Pupil-centric' approach in education;
- Create awareness in the society about science and scientific issues;

ACTION PLAN

- ✓ Develop a network of professionals and personalities to share their knowledge;
- ✓ Provide multi-disciplinary environment to students so that they appreciate inter linkages between various branches of science.
- ✓ Provide a platform for interaction between leading educationists, teachers, scientists and students.
- ✓ Encourage participation in "scientific activities" like:
  - i. Homi Bhabha Bal Vaidnyanik Competition (HBBVC) Guidance Sessions.
  - ii. Regional Mathematics Olympiad Guidance Sessions.
  - iii. National Children's' Science Congress (NCSC) activity: organization at Navi Mumbai level.
  - iv. An essay competition on "Nobel Laureatism"
  - v. Annual World Nuclear Energy Day celebration on 2nd December
  - vi. Science Utsav:
    - a) Day-1: Teachers' Conference
    - b) Day-2: Exhibition of Science Experiments,
  - vii. Fun with Science activity, especially around National Science Day.
  - viii. Science Nurture Club
- ✓ Activities at schools
  - i) Judging at Science Exhibitions in Schools and Junior Colleges (by invitation),
  - ii) Miscellaneous: Partial involvement in scientific activities of schools: via lectures and/ or interactive sessions on specific topics (as and when requested).
- ✓ Create links with national organizations in the field of science and science education.

ACHIEVEMENTS AT GROUND LEVEL

- × About 2000 students and 150 teachers are now being reached through these activities each year.

IN SHORT, WE AT NMSF, ENDEAVOUR TO:

- ◆ Give meaning to science in ways more than one, and
- ◆ Erase the artificial barriers that keep science away from the main stream of life.

OUR INDEBTEDNESS

We are indebted to several schools and colleges, a few institutions like i) Shree Gujarati Samaj, Vashi, ii) Father Agnel School, Vashi, iii) New Horizon Public School, Airoli, iv) Reliance Foundation School, Koparkhairne, & v) K. B. P. College, Vashi who have extended the use of their infrastructure for NMSF's activities and a large number of individuals, who have been active partners in our activities year after year.

For more information visit at http://www.navimumbaisciencefoundation.org

International year of periodic table 2019: It is elementary

Dmitri Ivanovich Mendeleev
(1834 -1904)

It is elementary Mr. Chemist... It is Mendeleev a Russian chemist [1] who said it and he meant it literally. Using the similarity in the properties of chemical elements he has shown a way of arranging them into a very useful tabular form. The location of an element in this periodic table almost completely describes its chemical properties and many physical properties as well.

Ancient philosophy considered Earth, Water, Air and Fire as elements of the universe from which (or using which) one could get anything else. Indian philosophy had one more element "the sky". Before 1600 CE chemistry was more of alchemy. Most of those working with chemicals were trying to make gold out of other chemicals or they were trying to find a formula for making things that are fabled to give eternity etc. Even Newton has tried his hand on Alchemy so much so that it is believed that he died out of mercury poisoning [2]. Apparently he used to taste the salts to identify them – a practice which today everyone knows gives much less chance of survival than what Newton had!!

Dalton's periodic table

It is after the year 1680 CE, following the discovery of Phosphorus that the chemical elements found some meaning among chemists. The general acceptance of atomic theory, often ascribed to the influence of Dalton who published his ideas in 1805, was the beginning of the modern scientific systemization of the inorganic chemistry.

Dalton's periodic table

The French book Traité Élémentaire de Chimie (Elementary Treatise of Chemistry - 1789) written by Antoine Lavoisier (discoverer of oxygen) is considered to be the first modern literature of chemistry. He had called a few chemicals like Oxygen, Mercury, Zinc etc as *elements* – those cannot be broken down further by chemical reaction – and classified them into metals and nonmetals.

The systematic study of chemical elements that went on after this time gave about 63 elements to be listed by Mendeleev 150 years ago. Mendeleev also knew there were many elements to be discovered and left blank spaces for their inclusion in the table. Why is it called *periodic* table? The similarity in the chemical properties of elements that had atomic weight separation of 8 made an English chemist John Newland propose the *law of periodicity* of elements, almost at the same time as Mendeleev has made his table [3]. Before this discovery came many relations among the elements like rule of triads, multiplicity of atomic weight of elements to that of hydrogen and stoichiometric etc. It is the combination of many such wonderful discoveries that culminated into today's periodic table.

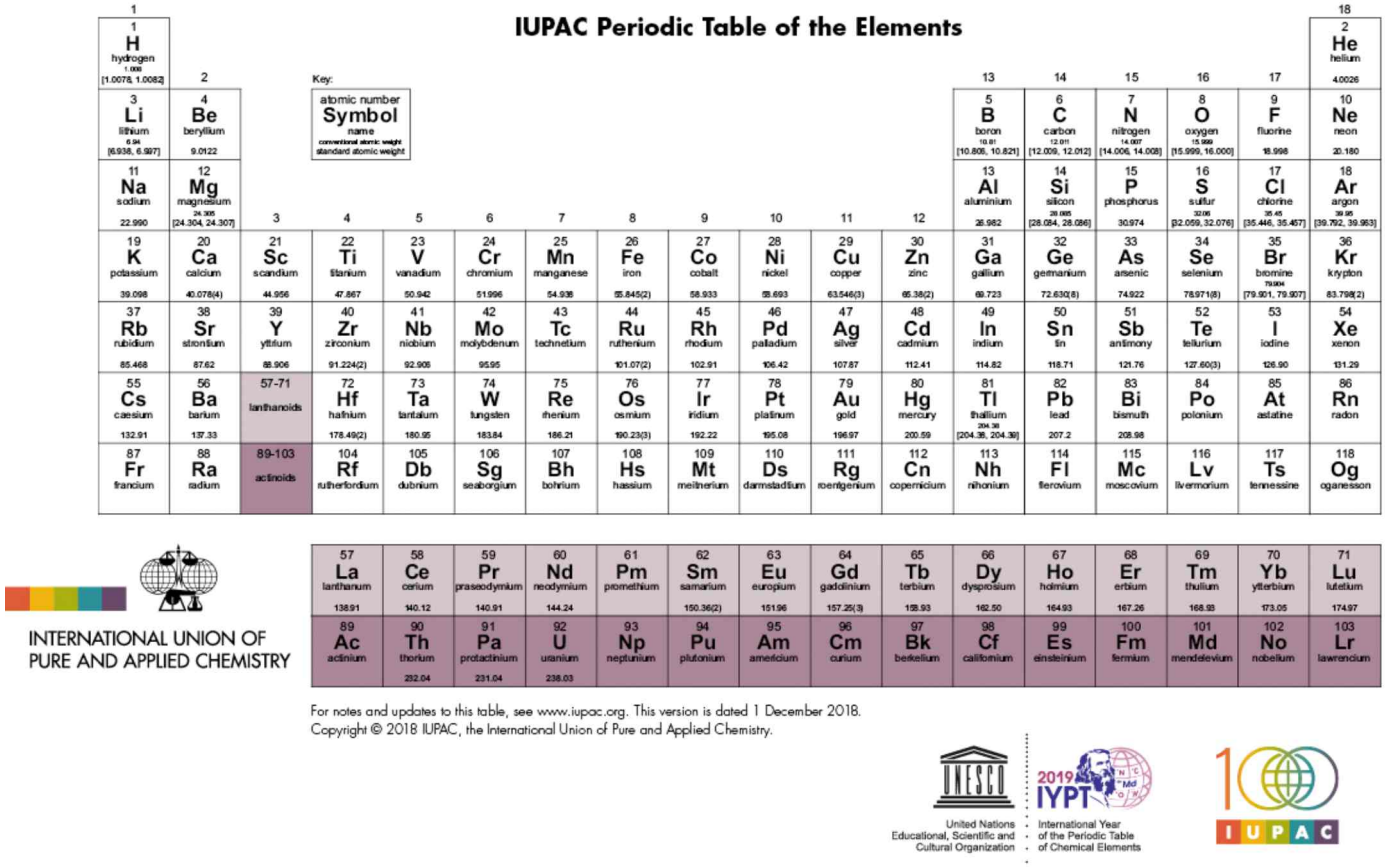
Mendeleev's Periodic Table 1885

Mendeleev's Periodic Table 1885

All these periodic tables were based on atomic weight for atomic number is notion of much later time. It is in 1914 – after the relation between the

frequencies of characteristic X-ray and the atomic numbers of the atoms that emitted it was established by and English physicist Henry Moseley - the periodic table was written according to the atomic number.

The United Nations General Assembly during its 74th Plenary Meeting proclaimed 2019 as the International Year of the Periodic Table of Chemical Elements (IYPT 2019) on 20 December 2017. The initiative for IYPT2019 is supported by International Union of Pure and Applied Chemistry (IUPAC) in partnership with the International Union of Pure and Applied Physics (IUPAP), European Association for Chemical and Molecular Science (EuCheMS), the International Council for Science (ICSU), International Astronomical Union (IAU), and the International Union of History and Philosophy of Science and Technology (IUHPS). IUPAC never has involved in record keeping of the developments in Periodic table. It is after the Second world war, when Actinide series of elements and a large number of artificial elements were discovered that IUPAC involved in recording the information of Symbols, accurate atomic weights and the (long form) of periodic table. The periodic table published by IUPAC in Dec 2018 [4] given below, lists 118 elements.



1. https://en.wikipedia.org/wiki/Dmitri_Mendeleev
2. https://en.wikipedia.org/wiki/Isaac_Newton%27s_occult_studies
3. https://en.wikipedia.org/wiki/History_of_the_periodic_table
4. https://iupac.org/wp-content/uploads/2018/12/IUPAC_Periodic_Table-01Dec18.jp

By Dr A.K. Rajarajan

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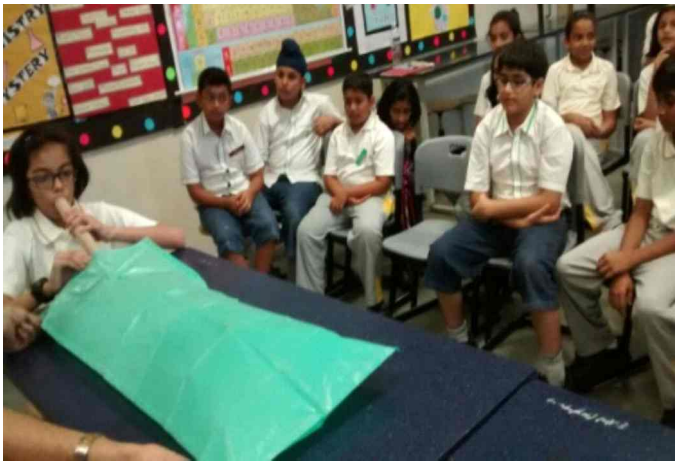
Fun with Science

It is a very thrilling programme from the point of view of students. It is being conducted by NMSF (Dr. A. M. Bhagwat, Chairman, NMSF, in particular) to promote interest in learning science and its focus is primarily on middle and high school level students. It has succeeded in establishing the fact that science is as easy as any other subject to learn. The experiments mainly deal with phenomenon in physics for which equipment needed are too abundant to be unavailable. These items are part of our day-to-day life (most of them being otherwise waste products). Through "Fun with Science Activity" NMSF conveys the joy that science education has in store for students. Several such programmes (more than 100) have been conducted so far. NMSF focuses on this activity around National Science Day which falls on Feb. 28 each year. To accommodate requests for the programme from very many schools, NMSF has started celebrating "National Science Month" instead – lasting from February 15 to March 15.

NMSF does not however limit the programme to the period cited above. It is available on demand during any part of the year. The programme is so fascinating that it has been organized during Ganesh Festival, Birthday celebrations, in residential society get to gathers for students, in individual flats, in a Mall and in the open in an Ashram school. The duration of the programme is about 2 hours and is restricted to about 40 students at a time for meaningful interactions.



One of the activities done by students during Fun with science

The experiments here are qualitative in nature, but with a little extra effort and cost they can be made quantitative too. They can thus become part of syllabus and add a new dimension to science education in schools where science labs do not exist – an idea too simple to be believed.

By Dr A. M. Bhagwat
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DON'T MISS IT.....

COMING UP IN NEXT ISSUE No 2

(JULY to SEPTEMBER 2019)

1. **Exciting journey through the discovery of black hole**
2. **Navi Mumbai Science foundation concept of Nobel Laureatism**
3. **Inspiring stories of school children's fighting for water conservation in rural Maharashtra....Special Repc**
4. **Student's corner**
5. **Teacher's Page**
6. **Parent's views**

Do you have a interesting educational story???
Share with US!!!!

NMSF Events Calendar 2019

January

Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Science Utsav

February

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

Fun with Science from 15 Feb to 15 March

March

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Pre-RMO

April

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June

Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

HBBVC Classes April to September (except May) every Sunday

July

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

RMO Guidence and Science Club every Sunday

August

Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Nobel Laureatism

October

Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Children Science Congress

November

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

HBBVC practicals full day

December

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

World Nuclear Energy Day

Picture Gallery

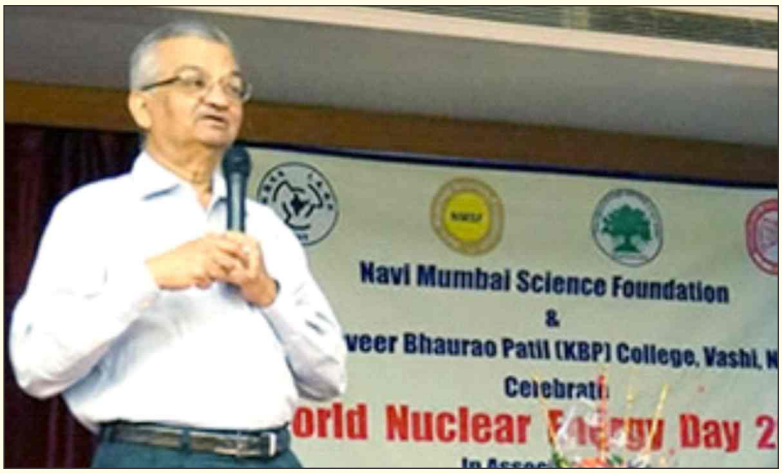
NMSF being honored on January 26, 2019 during Second annual function of “Vasudhaiva Kutumbakam-2019” organized by “In Major City” and “Priya Ads”. These organizations endeavor to bring together NGOs working in different fields in Navi Mumbai and Raigad region and give publicity to their activities.

Students explaining project on soilless agriculture

Homi Bhabha Bal Vaidnyanik Competition Guidance One day hands-on practical session

Exhibition of Science Experiments by students

Participants during Teachers Conference and one of teacher presenting work during the conference



Dr Anil Kakodkar and Dr P. Chidambaram addressing the gathering during World Nuclear Energy Day celebration at K.B.P College, Vashi, Navi Mumbai