

M *a* *t* *c* *t* *e* *s*.
Make the chemistry sexy

Some actions to make chemistry sexier



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**Please check also the Ma.t.che.s. - Homepage
for more material and information:**

<https://matches2017.jimdo.com/>

Spain

Name: **Chemical rocket contest**

Method:

Students must build a rocket which has to be able to fly as a result of the chemical reaction coming from mixing vinegar and bicarbonate

The rules of the contest are the following:

The gadget may be presented individually or in groups.

The criteria to mark the activity will take into account three aspects:

1. The time of the object flying in the air
2. Appealing design
3. Explanation of the chemical process

A good blast off of the rocket is when it is intentionally launched with determination by the students or/and when the rocket is expelled off the platform. Only in exceptional occasions, the jury will be able to authorize an additional blast off.

Conditions:

- Bottles made of glass or any metallic objects are not allowed.
- The vinegar and bicarbonate rockets will be assembled at the moment of the blast off.

The same day of the contest, each participant will go to the place chosen to launch the rocket according to an order established. They will have to explain to the jury the chemical reaction

Equipment/ material:

In order to build the rocket, a plastic bottle, decorative objects and a lid are required.

In order to carry out the chemical reaction, students will need vinegar and an empty tea-bag.



Costs:

It is recommended to build the rocket with recycled material.

A jar containing 200g of bicarbonate costs 35 cents, approximately.

A bottle of 750g vinegar costs 90 cents, approximately.

Evaluation:

In the first Cycle in Secondary Education, a lot of students participated in the contest whereas in the Second Cycle, the number of students decreased.

They didn't have much time to build the rocket, so we think for next editions, we will present the action as a class project, and we will give students time work and research in lessons.

Conclusion:

Having students participating in a contest in which they need to apply their scientific knowledge, increases the interest for the subject in general and makes it more entertaining.

Moreover, students were intended to investigate and to do some research about how to make the rocket fly as well as to guarantee being the longest time in the air.

If we take into account the effort made by the teachers to carry out this activity, we can conclude that it was worth it considering the results.

We believe that it has been an excellent activity to increase the students' interest for chemistry and science in general. We, therefore, intend to continue organizing this kind of activities. Students learn how to use a chemical reaction with a specific goal.

You can check our students' presentation of the contest at: <https://youtu.be/HJIVc1GfbMY>

Germany

Name: **Scientists reloaded**

Method:

The students take photos of a famous chemists and re-enact him or her. In addition, they create portfolios of this chemist in which his or her importance for chemistry is worked out. In the portfolios, attention should also be paid to particularities of the celebrities in their way of life or their significance for mankind. The form and contents of the portfolios are defined and standardized beforehand.

The photos and the portfolios are used to create posters (50 cm x 75 cm) that are displayed in an exhibition.

Equipment / Material:

For the photos: high-quality smartphone, better: digital camera; photo processing software

For the portfolios: internet access, word processing software

To create posters: desktop publishing software; online photo service

Costs:

Approx. 10 euros per poster; software: Between 30 and 100 euros per program, but many have the necessary software.

Evaluation:

In this action good results can be obtained with relatively simple means in a short time. The pupils had a lot of fun during the creation of the photos and were able to work independently, as most of them have the necessary technical equipment (smartphone); they were less enthusiastic about the portfolios. Many were overwhelmed by the use of DTP software.

For the teacher, the question of requirement arises: for use in the classroom (e.g. gallery course) it is also sufficient if the pupils work with their own portfolios and the posters "classic" with scissors and glue create.

For an exhibition with upscale requirements (open day, cultural evening, etc.), close supervision of the pupils and a considerable effort on the part of the teaching staff are required. Thus the portfolios have to be reworked and supplemented, as well as the posters

are created using DTP software, whereby a standardized layout can be taken into account. This can mean between three and five hours of intensive pc work per poster.

Conclusion:

This action places particular emphasis on the people behind the chemists. Many pupils find this interesting, the pupils have a lot of fun to create the photos.

The posters can be evaluated during classes during a gallery tour; the focus here could be on presentation techniques.

For "show posters" the teaching staff also has to invest a lot of work. However, in this case the students' pride of their photos is boosted.

An example:



Reloaded

Antoine Lavoisier





Lavoisier und seine Frau Marie, gemalt von Jacques-Louis David (1788)

Born: 26 August 1743 in Paris
Died: 8 May 1794 in Paris (executed on the Guillotine)
Residence: France
Nationality: French
Married to: Marie Lavoisier, née Anne Pierrette Paulze

Education:

- from 1751 lectures in natural sciences at the *Collège Mazarin*
- from 1760 law school; in 1764 graduation to „Doctor of Rights“
- from 1761 studies of natural sciences; first experiments in his own laboratory
- from 1765 provisional appointment in the *Académie des sciences* as assistant of chemistry (*chimiste adjoint*)

Milestones:

- introducing reproducibility through exact measuring, weighting and formalizing
- diamantizing phlogiston theory (fire-like element called phlogiston)
- founder of stoichiometry with his „law of conservation of mass“

Reloaded for:

- Lavoisier succeeded in overcoming prevailing dogmas of his time through precise working and observation, and above all through unbiased interpretations.

„Sie brauchten nur einen Moment, um diesen Kopf abzuschlagen, aber hundert Jahre genügen vielleicht nicht, einen ähnlichen hervorzubringen.“

Joseph-Louis Lagrange



Recreated von Paula und Marek

Geboren: 26 August 1743 in Paris
Gestorben: 8. Mai 1794 in Paris (auf der Guillotine hingerichtet)
Lebte in: Frankreich
Nationalität: Franzose
Verheiratet mit: Marie Lavoisier, geb. Anne Pierrette Paulze

Bildung:

- ab 1751 naturwissenschaftliches Vorlesungen am *Collège Mazarin*
- ab dem Jahre 1760 Jurastudium; 1764 Promotion zum Doktor der Rechte
- ab 1761 Studium der Naturwissenschaften; erste Experimente im eigenen Labor
- ab 1765 Beschäftigung in der *Académie des sciences* als Assistent der Chemie (*chimiste adjoint*)

Milestones:

- Einführung von Reproduzierbarkeit durch genaues Messen, Wiegen und Protokollieren
- Widerlegung der Phlogistontheorie (Feuererelemente der Verbrennung)
- Begründer der Stöchiometrie durch das „Gesetz von der Erhaltung der Masse“

Reloaded für:

- Durch präzises Arbeiten und Beobachten und vor allem durch unbefangene Deutungen gelang es Lavoisier, vorherrschende Dogmen seiner Zeit zu überwinden.

Quelle(n):

1. https://de.wikipedia.org/wiki/Antoine_Lavoisier#/media/Datei:Antoine_Lavoisier.jpg

2. <https://www.gutenberg.de/konzepte/la/la001/la001.html>

3. http://www.fraunhofer.de/DE/aktuelles/2014/05/05_1794_lavoisier.html

4. <https://www.chemie.de/lexikon/lavoisier-antoinette>

5. <https://www.chemie.de/lexikon/lavoisier-antoinette>

6. <https://www.chemie.de/lexikon/lavoisier-antoinette>



Make the chemistry sexy

Painting of Lavoisier and his wife: Von Jacques-Louis David - Metropolitan Museum of Art, online database: entry 436106 (accession number: 1977.10), Gemeinfrei, <https://commons.wikimedia.org/w/index.php?curid=28550>

Name: **Chemists' YouTube Channel**

Method:

The students create videos of impressive experiments. Possibly an online vote on the best experiment will be conducted.

Equipment / Material:

For the experiments: classical laboratory equipment, chemicals

For the videos: high-quality smartphone, better: digital video camera; video processing software, internet access

Costs:

Possibly for consumables for experimentation and for chemicals; video processing software is available from 30 euros (PC versions), smartphone apps are significantly cheaper but also less powerful.

Evaluation:

The pupils can experiment here quite simply and inexpensively. Many have a smartphone with video recording and editing; also the cutting of videos on the pc succeeds most easily.

The time required for the teacher is relatively high, since in most cases an expert supervision is necessary. Depending on the requirements, an experiment may take between one and three afternoons. In some experiments a special training of the pupils is necessary due to the danger potential.

The pupils showed much pleasure in experimenting and also used the action for self-presentation. By working with the video editing software, they were able to deepen their IT skills. Their own production of YouTube videos also gave them a glimpse of other YouTube publications and furthermore for editing techniques in film and television in general.

The publication of the videos on the internet is, of course, associated with risks, as other students huff the "producers" possibly with their "work". If people are shown in the videos, it must be very self-confident pupils. Parents must be consulted before publication.

Conclusion:

This action increases the fun of experimenting enormously. The pupils learn the handling of laboratory equipment and chemicals. At the same time, they deepen their IT knowledge and acquire cinematographic knowledge. Unfortunately the pupils focus very much on show experiments, their theoretical work-up is very difficult and mostly not desired.

Teachers may have to spend a lot of time supervising the recordings.

Watch the channel here:

<https://www.youtube.com/channel/UC1PO2KM9Lesu1oIK2FcIBKA/featured>

The screenshot shows the YouTube channel page for 'The Chemists'. The browser address bar displays the channel URL: <https://www.youtube.com/channel/UC1PO2KM9Lesu1oIK2FcIBKA/featured>. The channel banner features the text: 'The Chemists Videos immer Donnerstags (Voraussetzung es werden am Dienstag Videos produziert) Chemische Experimente'. Below the banner, the channel name 'The Chemists' is displayed with a subscriber count of 79. The main video is titled 'Vorstellungsvideo || The Chemists*' and has 341 views from 4 months ago. The video description reads: 'Hallo Leute, wir haben das Video ein bisschen verändert. Hoffentlich gefällt es euch. Lasst doch unbedingt wieder ein Like da. Voted doch mal in der Infocart mit! Eure Chemists! -----Materialien:'. Below the main video, there is a section for 'Beliebte Videos' (Popular Videos) with four thumbnails: 'Vorstellungsvideo || The Chemists*' (341 views), 'Elefantenzahnpasta machen || The Chemists' (236 views), 'Blaufärbende Mischung? Bluebottle || The Chemists' (170 views), and 'Mehlstaubexplosion Special-Guest? || The Chemists*' (162 views). On the right side, there is a 'Beliebte Kanäle' (Popular Channels) section with five recommendations: 'Dr. Sandra Lee (aka ...)', '100SekundenPhysi...', 'Mathe by Daniel Ju...', 'TheSimpleMaths', and 'Numberphile'.

Greece

Name: **Experiment - theatrical dialogues**

Method:

The activity involves a chemistry experiment, which students perform in groups. The experiment concerns the contraction and investigation of acids and bases using an index. Initially, the class is divided into groups of 4 people and the teacher provides all the students with the experimental material and a worksheet in which instructions are written for the execution. The experiment is based on the application of 4 parameters: (1) description of the experiment and question to be investigated, (2) hypothesis, (3) isolation of variables, (4) announcement of conclusions. Optionally, students can be given a sheet that contains the lesson theory. At the end of the experiment and after the conclusions, students dramatize the process, creating group theatrical dialogues that in the end create a theatrical text. The activity is for primary school children.



Equipment / Material:

red cabbage, lemon juice, orange juice and vinegar

Costs:

about 8 euros

Evaluation:

Performing experiments within a group cultivates a variety of skills that are necessary for the mental development and education of students.

During and until the end of the activity the children have managed to implement group and individual investigations and experiments to consistently follow the written instructions given to them to perform an activity, to control the variables that assume that they play a role in an experimental process as well as to redesign a single agent modification, each time, relative to the original experiment. In addition, students work effectively in groups, emphasizing respect for the personality and diversity of others, moving, observing, collecting and recording information.

At the same time they draw conclusions from the data they collect and decide whether their conclusions are consistent with their assumptions or forecasts and whether they allow for further forecasts. In this case they choose alternatives or alternative conclusions that may arise from available evidence. Thus, they convey conclusions in a clear and understandable way to the given audience while also discerning whether the conclusions or claims of a third party are data-based and result from proper manipulation of variables.

Finally they listen carefully to others and accept their views when they are documented while creatively negotiating disagreements in the process of making cooperative decisions. The teacher in this case is the students' assistant. It is he or she who guides them and leads them lead to discovery.

Finally, with the theatrical dialogue, students entertain and consolidate knowledge in an attractive way.

Conclusion:

The experiment combined with the theatrical play plays an attractive and interesting role for students.

They discovery knowledge in teaching a subject like chemistry that was considered repulsive and boring for them.

For teachers, of course, some preparation is required to apply this approach to the lesson. The students, however, enjoy and rejoice when they are led to the discovery of knowledge.

Name: **Kinetic game**

Method:

The activity is divided into two groups, the members of which bear names of acids and bases (e.g. vinegar, lemon, ammonia, detergent, etc.) common to each group.



In the middle of the room there is a person who represents the marker. This person has in front of him or her an opaque bag with the objects of the groups or with illustrations of these objects on paper (vinegar, lemon, detergent, etc.). He or she also has two balls in front of him or her - a red one and a blue one.



Each time the pointer removes an object from the bag. Then the respective member from each group has to think if the color of the marker, after the addition of the material, will become blue (base) or red (acid) and run to get the corresponding ball, returning back to his or her team.

If he or she has chosen the right ball, his or her team wins a point, if not, the point goes to the opposing team. The person who pretends the marker can be either a student, if the number of children is single or the teacher if the number of children is even. The winner is the team with the most points.

It is essential, before the game starts, to clearly set its rules, which will make clear that it is forbidden to push or detach the ball from the opponent's hands if he or she has already acquired it.

Equipment / Material:

two balls (red and blue)

images with objects (acids and bases)

a purse

Costs:

About 5 euros for the balls

Pictures from the internet

Evaluation:

Students learn more easily the theory of acids and bases through a fun game. They also learn to respect the opponent by adopting behavior that is subject to certain rules. An appropriate adaptation of the game includes children with hearing and speech problems, since they use objects rather than speech, and aims at eliminating such discrimination.

Teachers also feel the joy of the students and are not in the unpleasant position of coping with boredom and avoidance of the subject on the part of their pupils.

Conclusion:

Students learn in an amusing and enjoyable way.

Teachers feel the joy of their students and do not have the need to cope with the evasion and boredom of the subject on the part of their pupils.

Turkey

Name: **Momentary YouTube Channel**

Method:

The students create videos for motivation in chemistry classes.



The first video is called “Chemistry always wins” which can be found at:

<https://www.youtube.com/watch?v=6GBXTyWR124>

Equipment / Material:

For the videos: digital video camera; video processing software, dubbing software, internet access

Costs:

Video processing and dubbing software: Free Trial versions were used so that there was no cost.

Evaluation:

The first thing the students said they would do was a video which would be shot on green screen and they would add some special effects. They also prepared a trailer but the video which came out was totally different. Adding special effects must have been harder than they expected. After changing their minds, they shot another video easily, in a short time. Since they used trial versions of video editing and dubbing software, they did not pay any money. They finished the video in a few days.



The time required for the teacher was quite short, because the video does not include any chemical experiments. The video focuses on motivation into learning chemistry. All that the teacher needed to check was content.

The students enjoyed themselves shooting and editing and dubbing the video. According to what they state they are ready to prepare more videos soon. They could not use special green screen effects but they had some insight into it. They were able to broaden their knowledge of shooting a video, editing and also acting.

The students have published the video on their YouTube channel. Since it is accessible for everybody there are some risks such as undesired or insulting comments that might prevent them from publishing new videos on YouTube. Comments might be inactivated in order to prevent such undesired outcomes.

Conclusion:



The work that they have prepared gave the students joy and will possibly have positive emotional effects on students who have difficulty in learning chemistry. The students broadened their knowledge of IT and video shooting, editing and dubbing, also synchronizing of subtitles which can be challenging. It could have been a better video if it had included some direct connection into chemistry.

Poland

Name: **Experiment show**

Method:

Students prepare a show in which they design and conduct attractive experiments to be presented during the finals of a chemistry competition. The experiments are preferably to be made with the substances that are available in the household or that the students have access to.

First a research is made in which students use various sources (the Internet, TV programs, books, interviews with scientists and chemistry teachers) to find ideas for their experiment show. They design their experiments stating the list of necessary equipment and materials, describing in students' language the reactions that take place. The chemistry teacher receives the plan of the show to approve it or to suggest some necessary changes. In the plan students also make sure that safety procedures are followed.



During the show students conduct the experiments explaining the phenomena that take place.

Equipment / Material:

For the research: internet access, library

For the plan of the show: internet access, word processing software

To conduct experiments: laboratory equipment (provided by the chemistry teacher), chemical substances (provided by the students)

Costs:

May vary as it is for the students to provide the chemical substances used in the show.



Evaluation:

The show was organised during the finals of a competition in which all schools from our city took part. The contest has three parts and is very formal in its form and requirements. The show enables the competition to lose its "all nerdy" style. The participants found it very attractive and the students who performed the show had a lot of fun preparing and conducting the experiments.

As students basically worked independently, teacher's assistance was necessary (safety reasons) and though the experiments were to be designed with

chemicals that are easily accessible, some students came up with ideas that couldn't be realised without the teacher's help and some chemicals from the school laboratory were provided.

Conclusion:

This activity can be recommended hence it increases the students' self-confidence as they perform their experiments in front of students from other schools. What is more, the public is comprised of the participants of the final phase of a chemistry competition and the viewers are the best students in chemistry in the city. The activity allows students to work independently with some minor assistance from the teacher. Designing spectacular experiments, learning how to use laboratory equipment, explaining the theory behind the shown phenomena and the performance itself give the students a lot of fun.



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There is no author. Every partner has work groups – so each contribution is a work of many.

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