

Making tomorrow happen

What is important to you?



*Career
development*

*Climate
action*

*Future of
technology*

*Industry
innovation*

*Workplace
wellbeing*

ChemTalent STEM Guide 2023

CIA

CHEMICAL
INDUSTRIES
ASSOCIATION

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Purpose of this guide

What is in this guide?

The purpose of this guide is to provide the user with useful information on how to run a Science, Technology, Engineering and Maths (STEM) session, including preparing for the session and curating activities.

The guide also contains a number of examples of activities from ChemTalent members, as well as a list of organisations who can provide further advice and support.

Who is the guide for?

This guide is targeted at organisations who need help to start their own STEM programme and in running STEM activities.

It is also for schools to carry out their own sessions to enthuse pupils about STEM. The guide also contains company information should schools wish to reach out to organisations directly.

Who are we?

ChemTalent, part of the Chemical Industries Association (CIA), is a network of people working in chemical and pharmaceutical businesses in the UK who are either at the start of their career or keen to broaden their skills and voice their opinions on behalf of the UK chemical industry. It aims to be a coveted platform to inspire, to debate and to transform the future of our industry.

The CIA is the organisation that represents chemical and pharmaceutical businesses throughout the UK. Representation includes lobbying legislators, policy-makers and stakeholders on the issues that affect its member companies the most. ChemTalent sits at the heart of the CIA's Education and Employment Strategy Group, which deals with employment affairs, trade union relations, education and skills.

The network is made up of two groups, ChemTalent Committee and ChemTalent membership:

ChemTalent Committee – responsible for mapping the direction of the group and the wider operations of ChemTalent, led by the Young Ambassador. Members of this group, known as representatives, are at the start of their career (10 year or less) and working for a CIA member company. This group collaborates on projects and discusses key themes to help influence the work of the CIA.

ChemTalent membership – part of the wider network. Anyone with an interest in the chemical industry can join. This includes those seeking a career in the industry, university students, apprentices, graduates or early careerists.

What does ChemTalent offer?

- **ChemConnect:** Monthly e-newsletter keeping you informed about the latest news, events and policy developments.
- **Networking and events:** Expert speakers, skills sessions and the opportunity to meet with other industry professionals in a relaxed environment.
- **Get your voice heard:** Get involved at the heart of CIA's policy making and lobbying activities. Help shape the future of the chemical industry.

Membership is free and requires no commitment from those signing up:

<https://www.cia.org.uk/ChemTalent>

What is STEM? And why is engagement so important?



Science, Technology, Engineering and Maths are key disciplines when it comes to solving the world's biggest challenges.

Engaging all people on these topics is important, but it can be essential when it comes to younger people. To grow up with an increasing understanding of STEM can help with an understanding of what is happening around us. Any solution to the climate crisis has STEM subjects written all over it.

The climate crisis is one challenge that STEM subjects to the fore amongst younger generations – with millions of young people marching globally, asking the world to listen to Greta Thunberg and 'unite behind the science'.

We need to continue to recruit passionate people into STEM-based jobs to tackle the challenges that will come in the future.

Therefore it is key for the industry to promote STEM in education and as a career choice.

STEM is incredibly diverse, with many opportunities for different career paths, entry points and roles.

Engaging with young people on this topic will help inspire them to continue pursuing STEM within their education, and eventually begin roles within the industry.



Where to begin?

For organisations

The Institute of Electrical and Electronics Engineers (IEEE) give the following guidance when it comes to starting STEM engagement, which we believe to be a solid foundation:

- **Be sustained** (one-off interventions as part of a coordinated approach should not be overlooked).
- **Engage early with young people**, especially where there is a need to challenge stereotypes and build a sense of belonging and inclusivity.
- **Carefully designed**, informed by evidence, and commit to measuring change.
- **Involve parents or carers** to help work with socio-cultural issues and academic matters.
- **Not reinforce inequalities** (in or out of school) by being available and accessible to all.
- **Authentically and explicitly draw on an extensive range of role models** to ensure young people understand that STEM is inclusive and varied.
- **Work collaboratively across the sector** to identify complementary activities and support schools, colleges and educators to manage the wealth of opportunities available (including university outreach).
- **Create meaningful, practical/hands-on activities** (including work experience, mentoring, and coaching) to complement the theoretical aspects of introducing and illustrating the range of STEM opportunities.
- **Establish ways of ensuring that interventions can respond to local needs** but are also grounded in a set of key deliverables that are consistently presented to young people. This could be addressed through work with educators and professional development.

We recommend the following steps to start your STEM journey

- 1 — **Purpose:** Start by establishing the purpose – why do you want to do STEM engagement? E.g. to showcase the variety of careers within the chemical industry; to give back to your local community; to promote the organisation and attract new talent.
- 2 — **Ambassadors:** Appoint STEM ambassadors from within your organisation – they can either formally register as a STEM ambassador or simply volunteer to be part of your organisation's programme. Some schools require volunteers to undergo a DBS check, and volunteers who formally register as STEM ambassadors get this for free.
- 3 — **Content:** Using your purpose, create or find content that enables you to achieve this – lots of content has already been created and is accessible online, some examples are included in this guide.
- 4 — **Link-Up:** Connect with schools or academic institutions – information on how to do this can be found below.
- 5 — **Safety:** Carry out the necessary risk assessments and comply with the school's safeguarding protocol before carrying out any events.
- 6 — **Running sessions:** Preparation for sessions is key – ensure all paperwork, props and presentations are on hand before starting the session.
- 7 — **Engagement:** Remember to keep the sessions engaging – this is especially important when not doing a 'hands on' activity.
- 8 — **Review:** It is useful to review each session, and ask for feedback from the school/academic institution – this will help make improvements for future sessions.

Linking schools and organisations

A number of organisations exist already that can partner schools and organisations together. Some of these provide the service for free, whereas others require a small fee. Some example organisations are listed on page 5.

For schools seeking companies, a number of ChemTalent members appear in this guide along with STEM contacts. These can be contacted to take part in STEM sessions, or provide demonstrations of the activities listed.

List of useful organisations



STEM Learning – STEM Learning is the UK's largest provider of education and careers support in science, technology, engineering and mathematics (STEM). It also has an ambassador programme which anyone can join.

<https://www.stem.org.uk>



Centre for Industrial Education Collaboration (CIEC) at the University of York – CIEC offers science industries a range of tailored approaches to work with schools, supporting CSR and community outreach goals.

<https://www.york.ac.uk/ciec/school-support/>



I'm a Scientist get me out of here – I'm a Scientist is an online, student-led STEM enrichment activity. It connects school students with scientists through energetic real-time text based chats.

<https://imascientist.org.uk>



The Careers and Enterprise Company (CEC) – The CEC is the national body for careers education in England, supporting schools and colleges to deliver modern, 21st century careers education. Its mission is to help every young person find their next best step.

<https://resources.careersandenterprise.co.uk>



EngineeringUK – EngineeringUK is a not-for-profit organisation passionate about inspiring the next generation of engineers and creating a diverse future workforce that enables the UK to thrive.

<https://www.engineeringuk.com>



Science Industry Partnership (SIP) – SIP Ambassadors are a network of industry professionals who have been trained to engage, inspire and enthuse young people into careers within the science-based industries.

<https://www.scienceindustrypartnership.com/home/>



Example activities from our members

CRODA

Who are Croda?

Croda International plc is a British speciality chemicals company based in East Yorkshire. We are a global leader of speciality chemical ingredients, sold to a wide range of markets – from Personal Care to Health Care; from Crop Care to Coatings and Polymers.

Croda's products form vital ingredients in many 'household name' products and every day, every one of us will use a Croda product in some shape or form.

What do we do to engage school students?

We have developed a set of activities for both primary and secondary school children. The activities are themed around areas of science important to Croda, but focused on everyday life and designed to get children working scientifically. Teachers can run these activities easily themselves, or we offer an Ambassador scheme for schools local to our sites where we can go into schools to help deliver the activities and talk about what it means to work in an innovative chemical company.



Science for Schools

We have our own STEM programme with the goal to 'Inspire the Innovators of Tomorrow' showing the importance of Science, Technology, Engineering and Mathematics in everyday life. These activities form part of our Corporate Social Responsibility.



Want to find out more?

Whether you are a teacher or student looking to find out more on our STEM programme, take a look at our Science for Schools website.

If you can't find what you are looking for or have any questions then get in touch with: Hannah.Gorman@Croda.com

Fleece to Grease

Objectives: To understand what happens when different materials are mixed together. Children should learn about immiscible and miscible liquids and what an emulsion is.

Equipment (requirement is per group of 3)

- A plastic jug with ml markings
- 3 plastic jars and lids
- 100 ml vegetable oil – labelled A
- 300 ml water – labelled B
- 50 ml water with a few drops of food colouring 1 – labelled C
- 50 ml water/fairy liquid 50/50 mix with a few drops of food colouring 2 – labelled D
- 50 ml water – with a few drops of food colouring 3 – labelled E
- Pipettes

Practical

Discuss what is going to be done – 5 mins

- Mixing liquids to see what happens
- What do they expect to happen?
- How are they going to test?

Experimental work – 15 minutes

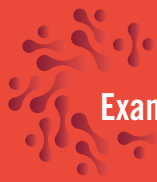
- Children should mix ~40 ml A and ~40 ml B, and see what happens when they are mixed, gently, or more vigorously by shaking (ensure lids are firmly on first)!
- Children can look at how long it takes for the layers to separate
- Then the children can add a small amount (10ml) of C into the mix and try again, does something different happen?
- This can be repeated with samples D and E
- D should make the mixture go white and cloudy and not separate (forming an emulsion) whereas C and E will only make the water change colour

Presenting results – 15 mins

- What did they see?
- Did all groups have the same results
- What will they write back to the company?

Questions for Class

- What should the company do to make sure it doesn't make an emulsion?
- Were the tests they used fair?
- What else could they have done?



GSK

Who are GSK?

GSK is a global biopharmaceutical company, prioritising in vaccines and speciality medicines to prevent and treat disease.

Millions of people worldwide use GSK products; from antibiotics, to steroid creams, to vaccines, to inhalers.

GSK focus heavily on attracting, hiring and retaining a **strong Early Talent community**. Highlighting the importance of STEM for GSK.

What do we do to engage school students?

Across different GSK sites, a variety of different approaches are used to get involved with STEM.

Our virtual **work experience** events reached hundreds of students throughout the pandemic. Outside of the pandemic time, we frequently host GCSE and A-Level students for work experience.

We also attend a variety of **external STEM events** with company representatives and stalls to inspire the next generation.

Everyone has time for STEM

Sometimes resources can be stretched, making it difficult for employees to find time for creating and carrying out STEM activities.

GSK use **SIP Ambassador training** for volunteering employees, which provides further resources and training to make STEM event preparation less time consuming and STEM events more impactful.

GSK have also experienced using **'Body Works on Tour'** – interactive exhibits provided by Glasgow Science Centre along with a team to take science straight to STEM events. There are many companies like this just a search away!



Smart Medicine

Introduction

GSK is a pharmaceutical company that makes medicine to treat different illnesses and diseases. Our medicines can be tablets or injections. It is very important that when one of our patients takes our products that the medicine does its job and makes the person better.

Today we are going to create a new 'smart' medicine.

Instructions

To make the new 'smart' medicine you will be working in a 'laboratory environment', so you need to make sure you are wearing your personal protective equipment!

When a person takes our new 'smart' medicine it will need to dissolve its coating and release the active ingredient at the right time in the body.

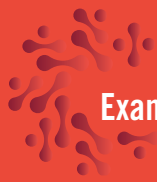
The new 'smart' medicine we make needs to release its active ingredient in the stomach **between 120 and 130 seconds**.

The coating of the 'smart' medicine must dissolve so that the smartie loses all its colour, **no earlier than 120 seconds and no later than 130 seconds**.

You can use any combination of our 'coating materials' to create our new 'smart' medicine.

You will have the following equipment:

- 'Smart' Medicine (smarties for the tablet)
- Sample coating materials (ketchup, honey, cooking oil and toothpaste to use as a coating)
- Solvent (lemonade to be the acid in our stomach)
- Stop watch
- Rubber gloves
- Paper towels/wipes
- Pen and paper
- Waste disposal unit



Who are Nufarm?

Nufarm is an Australian agricultural chemical company that produces a range of crop protection products including herbicides, insecticides and fungicides.

The UK manufacturing site based in Wyke, Bradford is one of the largest facilities the company operates globally. The products produced on the site are essential in helping farmers grow crops and feed the world.

Nufarm is also developing innovative solutions such as new omega 3 oil supplements and renewable feed to produce sustainable fuels that help tackle global warming.



What do we do to engage school students?

Nufarm believes that supporting the next generation of STEM professionals is important and helps improve community relationships. The main way the company engages with schools is via its 'NuGeneration' programme. This consists of volunteers throughout the organisation who arrange interactive activities for a local primary school (more details below).

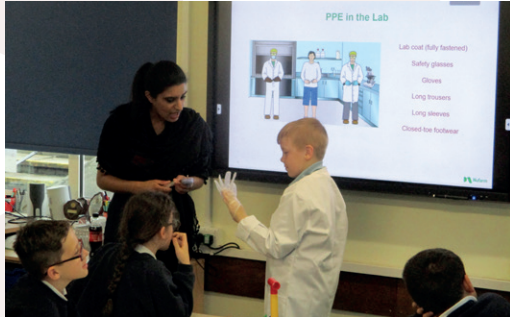
Nufarm are also partnering with an external provider to assist another secondary school with career based activities such as employee job profile panels and interview practice. These will help students prepare for the world of work.

Community Engagement – School Visits in action



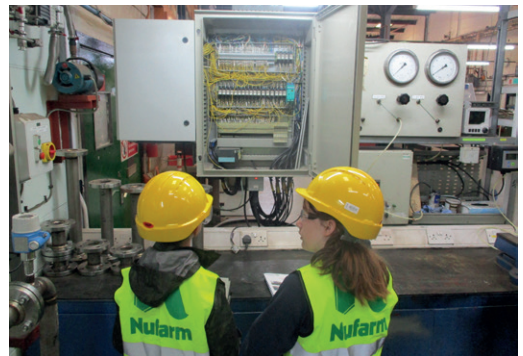
The NuGeneration team held a pre-visit for the year 6 students only. The aim of this pre-visit was to:

- provide a deeper understanding into what Nufarm manufacture
- allow the students to familiarise themselves with the laboratory equipment
- give a brief insight into the engineering department
- link Nufarm's crop protection products to the year 6 science syllabus.



The year 6 students visited the site, **clocked in**, and were **inducted** by the **Health and Safety department**.

The students visited the **Engineering department** in the correct PPE.



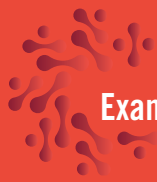
They were:

- taken to see the calibration rig and electrical workshop
- shown various type of instrumentation that are used on site
- given the opportunity to operate control valves and adjust flow rates.



The students then visited the **Quality Control Laboratory** in their lab coats, safety glasses and gloves. They:

- observed a Nufarm Scientist carrying out a laboratory experiment
- carried out a simple titration experiment themselves
- filled out their laboratory workbooks.



Stepan

Who are Stepan?

Stepan Company is a leading merchant producer of surfactants, which are key ingredients in consumer products such as laundry detergents, hard surface cleaners, disinfectants, shampoos and body wash, as well as customized solutions for the agricultural, oilfield and construction markets. Stepan is a leading supplier of polyurethane polyols used in the thermal insulation market. Stepan also offers high purity esters, fats and oils for the pharmaceutical, medical nutrition and dietary supplement industries.

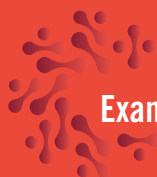
Stepan's global research and development team of 230 scientists brings innovative solutions to the market and work alongside our customers to help them be successful in their markets and be more efficient in delivery of their products and technologies.

What do we do to engage school students?

Stepan company recognises the importance of supporting STEM education and it is already involved in a few projects with schools. The HR Manager and Enterprise Advisor at Stepan tells us more about the company's involvement in providing guidance to children in Alder Community High School. Together with the help of the Careers Leader and wider senior leaders of the school, Stepan works to create opportunities for young people and help bridge the gap between education and the world of work.

"The main purpose of our work safari is to highlight the industry, the very real issue posed by an ageing workforce, the various positions offered on site and to linking their everyday lessons in school to the workplace. In our latest work safari, we engaged the Head of Chemistry at Alder High School and worked together to link curriculum topics with what we do at Stepan, such as titration. Accompanied by various leaders, children are given the opportunity to take part in site visits to show them this link and help their understanding"





VENATOR

Who are Venator?

We are a leading global chemical company dedicated to the development and manufacture of titanium dioxide (TiO₂) pigments and performance additives.

At Venator we are focused on delivering pigments and additives that make a difference to daily life and contribute to a more sustainable future.

Our broad and versatile portfolio of leading pigments and additives includes many well-known brand names and industry-leading products.

Developed by a talented team of experts, who are committed to continuous, customer-focused innovation, our products are marketed globally to a diversified group of customers.

Our work is focused on:

- **Titanium dioxide (TiO₂)**
- **Performance additives**

Within these areas we are a leading global producer in many of our key product lines – including TiO₂, color pigments, functional additives and timber treatments.

Based in Wynyard, UK, we employ approximately 3,400 associates worldwide and sell our products in more than 109 countries.

We are Venator – a conscientious chemical company committed to the safe, sustainable and responsible manufacturing of high performance TiO₂ pigments and performance additives.

Want to find out more? Visit www.venatorcorp.com



STEM into the future

We're committed to supporting and inspiring the next generation of future engineers, scientists and technologists.

We've made it our mission to actively inspire learning in STEM among secondary-school aged youngsters across the North East.

Working with Tees Valley Combined Authority (TVCA), our Wynyard headquarters has hosted pupils as part of our STEM Fest, an event designed in conjunction with TVCA to address the needs in the area and to challenge the conventional view of STEM, helping youngsters realise its rewarding career potential through interactive sessions and activities delivered by our experts.

What do we do to engage school students?

Venator attend a range of events including local skills and careers-related events to help bring STEM careers to students. We have registered STEM Ambassadors and enthusiastic employees who also regularly volunteer for a range of school outreach activities including interview skills sessions, careers 'speed-dating' and more.

We look forward to continuing our work in this area.

Ready to take on our titanium tower challenge?

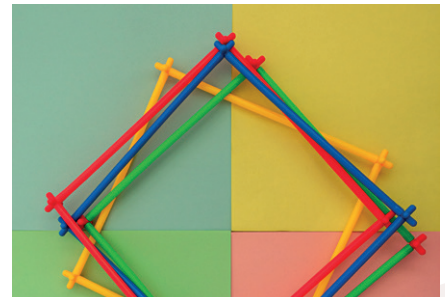


At Venator we are focused on delivering pigments and additives that serve customers in more than 109 countries. Before we transport our products, we need to ensure that they are stored safely at our manufacturing sites.

Focusing on one of our key values, teamwork, we are asking you and your classmates to build the tallest, strongest tower which could hold our titanium dioxide safely. Remember, innovation is key!

What you will need:

- A reusable building activity kit or materials such as those pictured. If you don't have a building kit available, think creatively and use materials around you, as long as they are safe to use
- A small secure container filled with flour or sugar granules – make sure the lid is on tightly!



Rules:

- Your tower design must hold the secure container for longer than 10 seconds.
- Max. of 4 people per group.
- If using a building kit, only use the materials within the kit.







Joining is free!

It's time to shape the industry...**become a member now**

Scan the QR code and complete the form to join or email chemtalent@cia.org.uk

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