



# CHEMICAL ENGINEERING WITH PROFESSOR ALEXEI LAPKIN

## TALKING POINTS

### KNOWLEDGE

1. Apart from saving time, can you give two other advantages of process intensification?
2. Who did Alexei talk to that helped him translate chemical reactions into a machine learning problem?

### COMPREHENSION

3. Can you explain the principle of industrial ecology?
4. What is the key feature of a complex system?

### APPLICATION

5. How would you go about estimating the size of the market for a new product?

### ANALYSIS

5. What prevented machine learning from being a useful technique when the principles of the method were first described in the 1950s?
6. Why has machine learning been particularly effective in fields such as image recognition?

### EVALUATION

7. Do you believe that process intensification will close the gap in medicine availability between rich and poor countries? Explain your reasoning and any other obstacles you can think of.

### CREATIVITY

8. Imagine if machines were able to replace roles traditionally performed by lab scientists. How might this change the way that (human) scientists are trained?

## ACTIVITIES YOU CAN DO AT HOME OR IN THE CLASSROOM

### INDIVIDUALLY OR IN SMALL GROUPS:

- Try thinking about your school through the lens of sustainability:
  - List all the different types of products that are used in your school, such as food and stationery.
  - Identify the environmental impact of each of these products and, if applicable, whether they are recycled or repurposed.
  - Mind-map or discuss as a group whether there are certain products or materials which could be replaced with more sustainable alternatives.
- Design a poster to explain cradle-to-cradle philosophy to other students. Using the website <http://www.c2c-centre.com/products> for inspiration, choose one example of a cradle-to-cradle product and describe the life cycle of the product.

## MORE RESOURCES

- The Institution of Chemical Engineers (IChemE) is an international society which has outreach resources on its website: [www.icheme.org/education/whynotchemeng](http://www.icheme.org/education/whynotchemeng)
- Watch a video that introduces the Department of Chemical Engineering and Biotechnology at the University of Cambridge: [www.youtube.com/watch?v=Rv-MCVTJ3Jw&t=3s](http://www.youtube.com/watch?v=Rv-MCVTJ3Jw&t=3s)
- The website <https://distill.pub/> hosts visualisations of machine learning applications.