Year 9 Science

Holiday Homework

Task 1

Complete chapter 5 review questions 1-15 (page number 108).

Task 2

Complete the **MAT** given below on ‘Spectrometer’. You need to refer to the rubric.

Year 9 Science Term 1 2018

Major Assessment Task

A STEM Project

Mrs Thomas & Ms. Shilpa

Name:

Criteria	1 Well below Standard	2 Below standard	3 At standard	4 Above standard	5 Well above standard
Chemical Science (show understanding)	Lists one scientific concept related to emission spectrum	Begins to describe at least two concepts related to emission spectrum	Describe least three scientific concepts related to emission spectrum	Describes at least four scientific concepts related to emission spectrum	Thoroughly describes at least four scientific concepts related to emission spectrum
Science Enquiry Skills	No evidence of the investigation to explore and test scientific concepts.	Little evidence of the investigation to explore and test scientific concepts.	Clear evidence in the investigation to explore and test scientific concepts. Explanation of one of the scientific concepts.	Clear evidence in the investigation to explore and test scientific concepts. Explanation of two of the scientific concepts.	Clear evidence in the investigation to explore and test scientific concepts. Explanation of three of the scientific concepts. .
Parts and materials	Very little construction for parts and materials used or model is constructed from kits without original input	Insufficient construction for parts and materials used or model is constructed from kits without original input	Some regard for appropriate materials in design	A good consideration of appropriate materials in design application	Resourcefulness of parts used. Innovative use of materials with a high degree of consideration of materials in design regarding application and affordability
Originality and creativity	Not done	Little originality and/or creativity demonstrated	Demonstrates some originality, imagination and resourcefulness in the parts used	Imaginative and original, showing resourcefulness in the parts used	Very imaginative and original, showing resourcefulness in the parts used

Spectrometer

When the different wavelengths of light are separated out, we see the emission spectrum of the light.

The instrument that is used to observe emission spectra is called a **spectrometer**. In its simplest form, a spectrometer consists of a box with two key elements: a slit to produce a thin parallel light beam, and a diffraction grating that spreads out the different colours in the light beam by wavelength.

As discussed in chapter 5, different elements will absorb and emit different wavelengths of light depending on the number and location of electrons in their electron shells. Spectrometers can be used to identify elements based on their emission spectrum.

Aim of this Task:

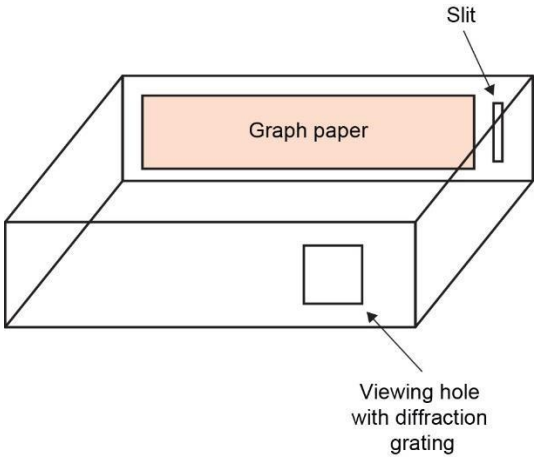
Build a simple spectrometer and use it to investigate the emission spectrum of different lights/ Look for specific colours and notice the spacing between the coloured lines

Build your spectrometer

You will need the following materials to build your spectrometer:

- A thin box, such as a cereal box
- A diffraction grating/CD
- Scissors
- Aluminium foil
- Sticky tape
- Graph paper

The following steps will guide you through the construction of your spectrometer.



Procedure

Step 1

On the box wall cut a vertical slit as shown in the diagram. This slit should be approximately 0.5 mm wide, 2mm high and have sharp edges. If you are having trouble creating straight sharp edges on your slit, use two pieces of aluminium foil (folded twice to create a sharp edge) to create your slit. Tape the two straight-edged pieces of foil at the location of the slit allowing a 0.5 mm gap between them.

Step 2

Tape the CD (diffraction grating) to the wall opposite the viewing slit, with the printed side against the wall and the rainbow side pointed toward the slit. Make sure that the edge of the CD is the same distance from the box side as the slit.

Step 3

Point the slit of your spectrometer at a light source (such as a light globe) and look into the viewing hole. Can you see an emission spectrum beside the slit? (If not, your diffraction grating may not be aligned correctly. Try rotating the diffraction grating by 90°!)

Step 4

Keep your graph paper handy. You will need it soon.

How does the spectrometer work?

Explore the main components of your spectrometer to make sure you understand how it works. Use the questions below to guide you. You could research on the internet to find the answers.

1.Write a Hypothesis for this activity.

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2. What is the purpose of the slit?

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3. Why should it be as narrow as possible?

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4. The diffraction grating

What is the purpose of the diffraction grating?

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Calibrate your spectrometer

Your spectrometer is useful to allow you to see an emission spectrum of light. However, you currently have no way of measuring which wavelengths of light you are seeing. If you want a more precise instrument that can identify which wavelengths are present, you need to calibrate your spectrometer. Calibration is the process of configuring an instrument so that it can accurately measure something.

To calibrate your spectrometer, carry out the following steps:

1 Cut out a strip of graph paper and tape it inside your spectrometer next to the slit as shown in the previous diagram.

2 Point your spectrometer at a source of white light (such an incandescent lamp) and notice where the emission spectrum of this light is located on the graph paper.

3 Mark on the graph paper the beginning and the end points of the emission spectrum you see inside your spectrometer.

4 The blue end of the spectrum will be at approximately 400 nm and the red end will be at approximately 700 nm. Label the end points of your emission spectrum on the graph paper with these wavelengths.

5 Now create a scale on your graph paper to indicate each 100 nm mark between 400 nm and 700 nm.

Your spectrometer is now calibrated.

6**. Can you predict the sodium line?**

It emits bright yellow light. This yellow light has a wavelength of approximately 589 nm. On an emission spectrum, the location at 589 nm is called the 'sodium line'. You will now predict, and then check, the location of the sodium line in your spectrometer.

Predict

Using the scale on your graph paper, predict where the sodium line will be. Make a mark on the graph paper of this location.

Check

Place a sodium lamp near to the slit. (**For this section only)**- You can complete this section at **school** if you can't find a sodium lamp.

Discussion and reflection

5. How accurate was your prediction of the location of the sodium line? What does this tell you about how precisely your instrument is calibrated?

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6. Explain the reasons for obtaining non-identical emission spectrum/spectral lines when using different lights sources.

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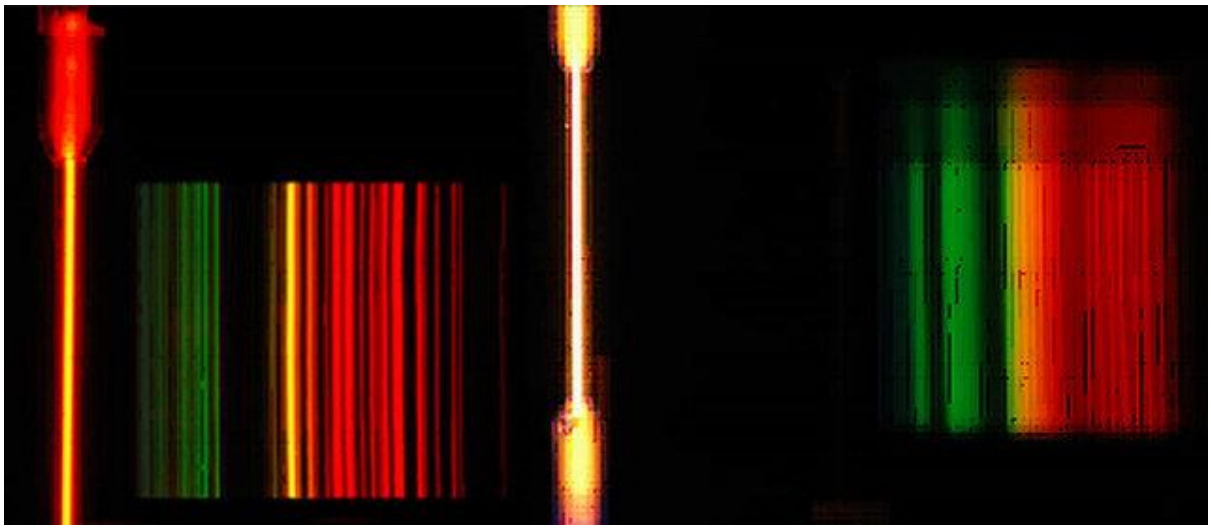

You will see spectral lines similar to these when you point your spectroscope at different light source

Credit: NASA