Name:…… Date:……

Star chemistry

Space looks like a big dark area dotted with stars and planets. In fact,there is a lot of chemistry happening - tiny particles smaller than anything we can see are reacting together at distances further away from us than we can imagine. Scientists are exploring what is going on 'out there', using the information to work out how molecules are made and if there really could be life elsewhere in the universe. This is really the final frontier!

Seeing space

In the winter, the constellation Orion can be seen in the sky in the northern hemisphere. Look at the projected pictures. Figure 1 is a picture of the constellation. Close-up pictures of parts of Orion are shown in Figures 2, 3 and 4. The close-ups were taken with the very powerful Anglo-Australian Telescope, which is in Australia. The colours are the true colours – they have not been added as an effect. The pictures tell scientists about the chemical elements there are in space.

What you do

1. Complete the observation table to record what you see in the three close-up pictures.
2. Look at the picture of the Horsehead Nebula. Check the main colour visible in this picture. Use the **Seeing space information table** to find out what material gives this colour.
3. Now repeat this with other colours. Don't forget to include black.
4. Repeat the same steps with the other two pictures.

Seeing space information table	
Colour	*What makes the colour*
Red	Atomic hydrogen
Yellow	Mixture of atomic hydrogen and molecular oxygen
Green	Molecular oxygen
Blue	Starlight reflected by dust
Black	Dust
Purple	Atomic hydrogen and starlight reflected by dust

Observation table

Picture name	**Colours**	**What makes the colours?**
The Orion nebula		
The Horsehead nebula		
Reflection nebula in Orion's sword		

Questions

1. What is the most common substance in the three pictures?

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2. Why is this substance the most common?

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3. What causes the black shape of the 'horsehead' in the Horsehead Nebula

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4. Why is a telescope needed to see the colours in the pictures?

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Note: This resource can be downloaded as part of a set of activities investigating the chemistry of outer space (https://rsc.li/3jPAUBC) or for use with a lesson plan for 14–16 year olds exploring molecules in space and the possibility of extraterrestrial life (https://rsc.li/3ic3s7D).