

Name:

Grade:

School:

Date:

WithOnePlanet

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Carbon
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Student worksheets



Introduce

Lesson 1
Student worksheets
Carbon – a reactive element

Years 9 to 10



WithOnePlanet.org.au

INQuIRY     

WithOnePlanet

Open education
An xpend Foundation initiative

Carbon – a reactive element

POE demonstrations – Student worksheets

(Predict, Observe, Explain)

Activity 1: Blowing out candles

Your teacher will conduct this demonstration for you under safe laboratory conditions.



Alternatively, you can see this experiment in action here:
<http://www.trueactivist.com/15-awesome-chemistry-gifs/>



Predict

What do you think will happen to the candle when the vinegar and baking soda mixture is poured over it?

Source:

True activist, *15 Awesome Chemistry Experiments*, online video viewed 24 February 2014, <<http://www.trueactivist.com/15-awesome-chemistry-gifs/>>.

Observe

Remember to use as many of your 5 senses (see, hear, touch, smell, taste) as is safe to use to observe what happens.

What happened to the candle when the vinegar and baking soda mixture was poured over it?

Explain

Can you explain what you just observed?

Activity 2: Dry ice bubbles

Your teacher will conduct this demonstration for you under safe laboratory conditions.



Alternatively, you can see this experiment in action here:

<http://www.youtube.com/watch?v=76CNkxizQuc>



Predict

What do you think will happen when the block of dry ice is submerged into the warm soapy water?

Source:

True activist, *15 Awesome Chemistry Experiments*, online video viewed 24 February 2014, <<http://www.trueactivist.com/15-awesome-chemistry-gifs/>>.

Observe

Remember to use as many of your 5 senses (see, hear, touch, smell, taste) as is safe to use to observe what happens.

What happened when the dry ice was submerged under the warm soapy water?

Explain

Can you explain what you just observed?

Activity 3: Sugar snake

Your teacher will conduct this demonstration for you under safe laboratory conditions.



Alternatively, you can see this experiment in action here:

<http://www.youtube.com/watch?v=AP6rTji59NM>



Predict

What do you think will happen when the acid is mixed with the sugar?

Source:

True activist, *15 Awesome Chemistry Experiments*, online video viewed 24 February 2014, <<http://www.trueactivist.com/15-awesome-chemistry-gifs/>>.

Observe

Remember to use as many of your 5 senses (see, hear, touch, smell, taste) as is safe to use to observe what happens.

What happened when the acid was mixed with the sugar?

Explain

Can you explain what you just observed?

Student observation activity: Where on earth is carbon?

Aim: To observe, compare and analyse a number of different forms of carbon.

SAFETY:

DO NOT taste or directly touch any of the carbon specimens.

Labels (and HAZCHEM warnings, where relevant) have been provided for each sample, giving additional safety instructions where appropriate.

Materials:

- > A small labelled* sample of each of the following substances: carbon dioxide, carbon monoxide, a piece of charcoal, a rod of carbon black, crude oil and chalk.
 - *This label will include a **HAZCHEM** sign (and accompanying explanation of its meaning) for any substances that are hazardous for humans.
- > A labelled 3D molecular model of each of the following substances: graphite, diamond, Buckminster fullerene and carbon nanotube.

Method:

1. Ten different substances have been laid out around the room for you to observe**. Some of these are samples of the actual substance, while for others, their molecular structure is provided.

These substances include: carbon dioxide, carbon monoxide, a piece of charcoal, some carbon black powder, graphite, diamond, Buckminster fullerene, carbon nanotube, crude oil and chalk.

**Alternatively, you can view an image of each substance or molecular model on the following page.
2. Noting safety instructions above, carefully observe each of the specimens using as many of your senses as is safe and appropriate to do so.

If you are not sure how to approach the sample safely, please check with your teacher.
3. From your observations, complete as much of the table in the Results section as you can.
4. Conduct research (e.g. ask other students, look on websites, encyclopaedias, etc.) to find out the information for any sections of the results table that you are unable to complete yourself.

1. Carbon dioxide



2. Carbon monoxide



3. Charcoal



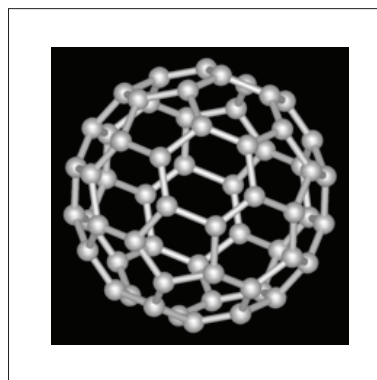
4. Carbon black



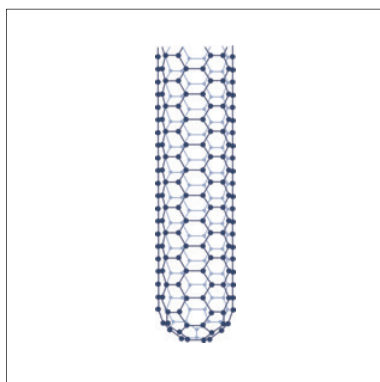
5. Diamond



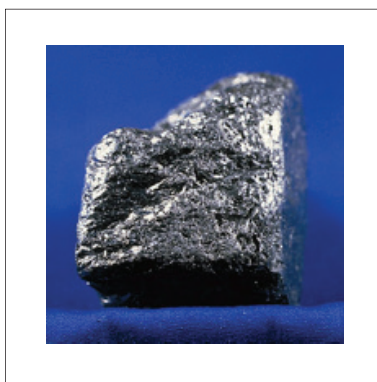
6. Buckminster fullerene



7. Carbon nanotube



8. Graphite



9. Crude oil



10. Chalk



Sources:

1. http://i.ebayimg.com/00/s/MTAwMFgxMDAw/S%28KGrHqV,InME8V%2858tVSBPNJB5iIjg~~60_35.JPG
2. <http://www.themakeupfoundation.com.au/media/pics/site/imagecache/5/6/562A60329F2003A32506E2C5FA67EF64.jpg>
3. http://upload.wikimedia.org/wikipedia/commons/thumb/1/11/Charcoal-at-Campfire-DSC_3206w.jpg/760px-Charcoal-at-Campfire-DSC_3206w.jpg
4. <http://upload.wikimedia.org/wikipedia/commons/c/c2/C%2C6.jpg>
5. External appearance: <http://upload.wikimedia.org/wikipedia/commons/6/6f/Brillanten.jpg>

- Structural image: http://upload.wikimedia.org/wikipedia/commons/9/96/Diamond_animation.gif
6. <http://upload.wikimedia.org/wikipedia/commons/8/82/Fullerene-C60.png>
 7. http://upload.wikimedia.org/wikipedia/commons/thumb/9/9b/Carbon_nanotube.svg/159px-Carbon_nanotube.svg.png
 8. <http://upload.wikimedia.org/wikipedia/commons/f/f3/GraphiteUSGOV.jpg>
 9. http://upload.wikimedia.org/wikipedia/commons/a/ae/Petroleum_cm05.jpg
 10. <http://upload.wikimedia.org/wikipedia/commons/1/14/Craie2.jpg>

Results:

Form of carbon

Answer the following 5 questions for each form of carbon in the table below.

Q1: Observations (including state of matter at room temperature, colour and texture)

Q2: What other elements (if any) are a part of this form?

Q3: Chemical formula

Q4: Where can this form of carbon be found on the Earth?

Q5: What processes on the Earth (including man-made processes in the science lab) produce this form of carbon?

1. Carbon dioxide	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:
2. Carbon monoxide	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:

3. Charcoal	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:
4. Carbon black	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:

5. Diamond	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:
6. Buckminster fullerene	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:

7. Nanotube	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:
8. Graphite	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:

9. Crude oil	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:
10. Chalk	Q1: Answer	Q2: Answer	Q3: Answer
	Q4: Answer	Q5: Answer	Other observations:

Discussion:

Q1: Besides all containing the element carbon, were there any other features common to ALL the samples? If so, identify them.

Q2: There are many categories under which these substances can be grouped. For example, each substance exists naturally in one of three states of matter – solid, liquid and gas. Therefore, the 10 different samples could be grouped under these three categories.

Devise one other way that you could place the 10 different samples into categories and draw this as a table in the space below.

Conclusion:

Q3: Write your own conclusion, which is related to the aim and includes a brief summary of the results.
