# Sample Questions
<u>Year 12</u>

2008 Year 12

Question 4

During the refining of oil considerable effort is made to "reform" the linear hydrocarbons present, converting them into branched molecules. These branched molecules make the combustion process in cylinders of vehicles "smoother" by increasing the time taken for molecules to react. Petrol contains significant amounts of octane, one isomer of which has its carbon framework shown.

Which framework below is the same as the isomer of octane shown above?

A.   B.   C.   D.
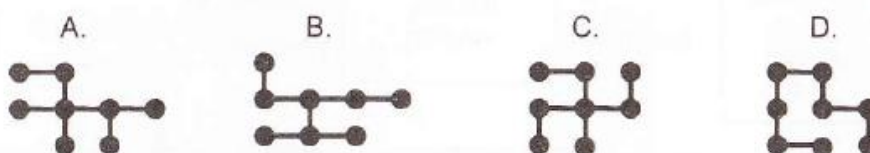
2008 Year 12

Question 16

Nylon is an extremely useful synthetic polymer that is strong and durable. As such, it is used in a wide variety of applications, including pantyhose, climbing ropes, parachute fabric, gear wheels and curtain runners. However, its structure at the molecular level varies according to its use. Consider the following diagrams which show sections of nylon polymers used for different purposes.

Structure I   Structure II   Structure III
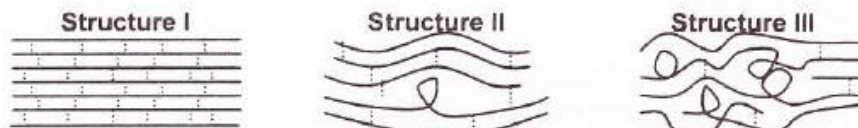
Which structure is best matched to its properties and uses?

	Structure	Strength	Rigidity	Hold on dye	Static build up	Use
A.	I	High	Low	Low	Low	Pantyhose
B.	II	Moderate	High	Moderate	Moderate	Curtain runner
C.	III	Low	Low	High	Low	Climbing rope
D.	I	High	High	Low	High	Gear wheel

2008 Year 12

Question 29

John Constable, a famous British landscape painter of the 1700s, introduced definition into his paintings by using "white lead" to highlight features. White lead, now called lead carbonate, was made by placing vinegar into lead pots surrounded by horse manure. Over several months a self-sustaining process developed where the lead reacted to form a mixture of lead acetate and lead hydroxide and finally, in the presence of carbon dioxide, lead carbonate.

Which of the following reactions is most likely to be part of this process?

A. $2Pb + 3CH_3COOH \rightarrow Pb(CH_3COO)_2 + Pb(OH)_2 + C_2H_4$
B. $Pb(CH_3COO)_2 + Pb(OH)_2 + CO_2 \rightarrow 2PbCO_3 + 2CH_3COOH$
C. $CH_3COOH + NH_4OH \rightarrow NH_4CH_3COO + H_2O$
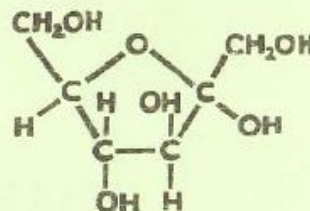D. $2CO_2 + 2H_2O \rightarrow CH_3COOH + O_2$

Sample Questions

Year 11

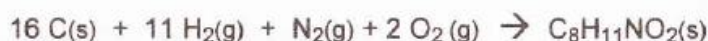**Question 2**

What is the percentage mass of carbon in fructose?

A. 33
B. 36
C. 40
D. 47

Fructose

Question 6

If the molecule dopamine were made from its elements, the equation representing the overall production would be:

$$16\ C(s)\ +\ 11\ H_2(g)\ +\ N_2(g) + 2\ O_2\ (g)\ \rightarrow\ C_8H_{11}NO_2(s)$$

If the raw materials available were as follows:
Carbon: 112 moles, Hydrogen: 55 moles, Nitrogen: 10 moles, Oxygen: 15 moles, how many moles of dopamine could be made?

A. 5   B. 7   C. 10   D. 15

Read this information, which is needed for the following two questions.

It has been noticed that in hot weather hens lay eggs with thinner shells, which causes problems because they break more easily. Hens cannot perspire so, when it is hot, they cool down by panting. This causes CO_2 to be removed more quickly from the blood. This affects an equilibrium situation that reduces the dissolved H_2CO_3 and thus the carbonate ion concentration in body fluids. Reduced carbonate means that less is available for making proper eggshell by combining calcium and carbonate ions. Poultry farmers are considering supplying the hens with carbonated drinking water in hot weather to rectify this problem.
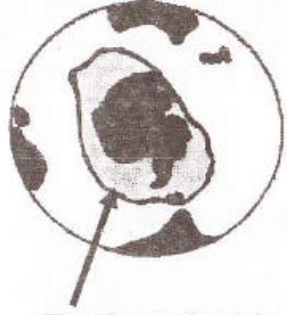

Question 13

Which of the following chemical equilibrium reactions is <u>least</u> likely to be involved in this process?

A. $H_2CO_3(aq) \rightleftharpoons H^+ + HCO_3^-$ B. $Ca^{2+} + 2OH^- \rightleftharpoons Ca(OH)_2(aq)$

C. $CO_2(g) + H_2O(l) \rightleftharpoons H_2CO_3(aq)$ D. $HCO_3^- \rightleftharpoons H^+ + CO_3^{2-}$

4

The ozone layer in the stratosphere filters out ultraviolet rays that cause skin cancer and harm marine life. The Montreal Protocol banned the use of ozone-destroying chlorofluorocarbons more than 20 years ago. Over the Antarctic the "hole" (area of thinning) in the ozone layer was reducing in size by 2002. By 2006, however, it had expanded to near-record size, thought partly to be due to exceptionally low temperatures in the region. CFCs contain carbon plus varying proportions of fluorine and chlorine. Two CFC molecules are shown here. All the bonds shown can swivel, so all positions around each carbon atom are equivalent.

The Ozone "Hole"

[i]
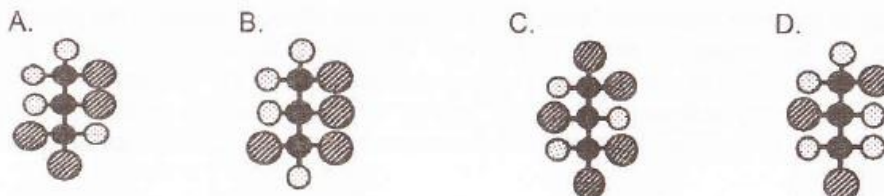
[ii]

○ Fluorine

◍ Chlorine

● Carbon

Question 25

Considering only CFCs with the formula $C_2F_4Cl_2$ (as in diagram [i]) determine how many different CFCs are possible.

A. 1   B. 2   C. 3   D. 4

Question 26

Propane molecules always have 3 carbon atoms linked in a chain. Diagram [ii] shows the CFC trichloro pentafluoro propane. Which of these would also have that name?

A.   B.   C.   D.

Sample Questions
Year 9-10

Question 3

Acids can be distinguished from bases using an indicator such as litmus paper. In an acid solution, blue litmus turns red; in a base solution, red litmus turns blue. When a student tested a solution with blue litmus paper, it stayed blue. This shows that the solution

A. must be pure water.
B. is not acidic.
C. is neither acidic nor basic.
D. must be basic.

Question 4

Selenium (Se) is an uncommon element. It and its compounds are used to tint glass red, to make special kinds of steel, in some electronic components, and in making photocopiers. In its chemical properties it resembles sulfur. Selenic acid and sulfuric acid are similar in many ways. What is the likely formula for selenic acid?

A. $HSeO_3$ B. $HSeO_4$ C. H_2SeO_3 D. H_2SeO_4

Question 6

When the compound ammonium dichromate, $(NH_4)_2Cr_2O_7$, is heated it decomposes as shown in the diagram.

Which equation correctly represents the decomposition of ammonium dichromate?

A. $(NH_4)_2Cr_2O_7 \rightarrow N_2H_3 + 2Cr + 4NH_2$
B. $(NH_4)_2Cr_2O_7 \rightarrow N_2H_3 + N_2 + 4CrO_2$
C. $(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_3 + H_2 + 4N_2O$
D. $(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_3 + N_2 + 4H_2O$

Question 30

A student started growing a large crystal of copper sulfate by leaving a small well-formed crystal in a saturated solution of copper sulfate in an evaporating dish. After a few days, the crystal was removed from the solution and weighed. It was then returned to the solution, and the dish and its contents were weighed together. After the dish had been standing for a further 24 hours, the measurements were repeated.

Mass of crystal on first weighing   =   1.92 g
Mass of dish and contents on first weighing   = 56.36 g
Mass of crystal on final weighing   =   2.85 g
Mass of dish and contents on final weighing   = 53.86 g

What mass of copper sulfate crystallised when one gram of water evaporated?

A. 0.37 g   B. 0.93 g   C. 1.00 g   D. 2.50 g

Use the following information for Questions 19 and 20

The density of a substance is defined as the mass of a substance in a given volume. Density can be expressed as grams per cubic centimetre or $g\ cm^{-3}$. The density of gold (Au) is $19.3\ g\ cm^{-3}$ and the density of silver (Ag) is $10.5\ g\ cm^{-3}$.

Question 19

A jeweller melted together a $1.0\ cm^3$ block of gold with a $4.0\ cm^3$ block of silver. What is the mass, in grams, of the resulting mixture?

A. 15.3   B. 21.9   C. 61.3   D. 87.7

Question 20

What is the density of a mixture containing 19.3 g of gold and 21.0 g of silver?

A. $13.4\ g\ cm^{-3}$ B. $14.9\ g\ cm^{-3}$ C. $20.15\ g\ cm^{-3}$ D. $40.3\ g\ cm^{-3}$

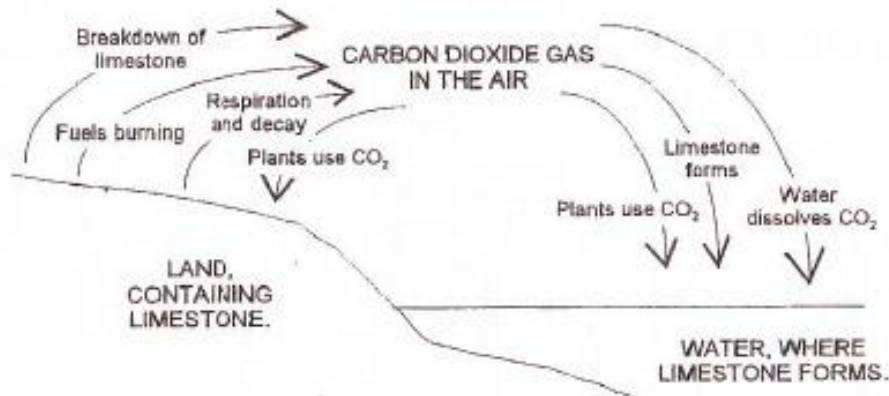# Sample Questions
Year 7-8

Question 5

It has been suggested that Global Warming is being caused by too much carbon dioxide (CO_2) in the air. CO_2 goes in and out of the air naturally, but in recent years it has been going into the air faster than natural processes can take it out. Limestore is a common rock that holds a large amount of CO_2.
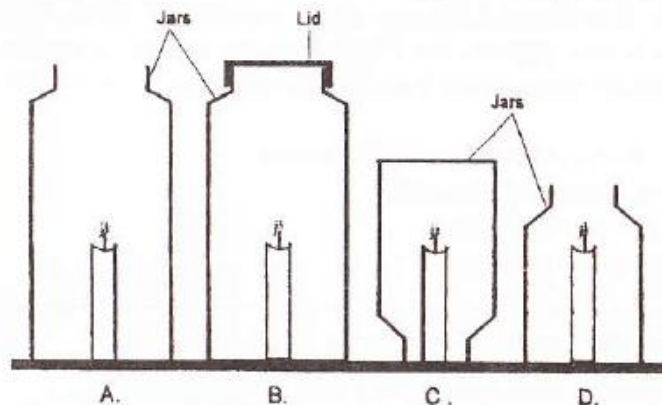

Of the processes shown in the diagram, which one has contributed most to the increase of CO_2 in the air?

A. Faster formation of limestone.   C. Plants using more CO_2.
B. More fuels being burnt.   D. Water dissolving more CO_2.

Question 9.

Which of the following candles will run out of oxygen and go out most quickly?

Question 13.

Flint is a kind of black stone that was valued greatly by ancient people who made stone tools. It is formed of very small crystals of silica, SiO_2. Flint occurs plentifully in only a few places, so it became an article of ancient trade. What property of flint would have made it prized for making stone tools?

A. Flint is a black stone with very small crystals.
B. Flint forms hard sharp edges easily.
C. Flint is plentiful in certain places.
D. Flint was valuable for trading.

Question 27.

This diagram refers to *changes of state*.

Water was boiled and the steam collected. The steam was placed in a freezer where it first condensed as liquid water again, then froze and became ice.

What is the correct sequence of the states that the water went through?

A. Q, R, P, Q
B. Q, P, Q, R
C. Q, P, R, P
D. Q, R, Q, P