Subject knowledge tests: pre-16 chemistry

Test 2: questions

For each question, select the correct answer – A, B, C or D.

1 When magnesium ribbon is burned in air, a bright, white light is produced and white solid is left over. Where did the white solid come from?

A It was inside the magnesium.

B It is ash from burning the magnesium in air.

C It was formed in a reaction between magnesium and air.

D It is carbon from burning the magnesium in air.

2 A car has 60 kg of fuel put in its tank. After driving, the tank is empty. What is the mass of exhaust gases produced while driving?

A The gases have the same mass as the fuel that went into the tank.

B The gases have greater mass than the fuel due to reaction with oxygen gas.

C Gases are lighter than liquids, so the mass is less.

D The fuel is converted to energy to drive the car, so the mass is less.

3 Which list states the names of substances that give an alkaline solution when added to water?

A Potassium hydroxide, ammonia, sodium chloride

B Sodium carbonate, ammonia, calcium oxide

C Sodium carbonate, potassium chloride, magnesium nitrate

D Magnesium chloride, sodium hydroxide, calcium oxide

4 What is in between the particles in air?

A Empty space, a vacuum.

B Bacteria or viruses.

C Bonds or forces.

D Carbon dioxide gas.

5 50 g sodium chloride (salt) is added to a beaker of water of mass 200 g. The sodium chloride is stirred until it dissolves completely and cannot be seen any more. What will the mass be now?

A 200 g because the dissolved salt can't be seen.

B 250 g because 200 + 50 = 250, nothing is lost.

C Less than 250 g because a gas is given off.

D More than 250 g because sodium chloride splits up when it dissolves.

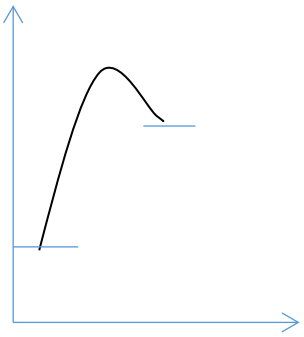
6 Which statement about the properties of concentrated acids and alkalis is correct?

	Acid property	Alkali property
A	Tastes sweet	Tastes sour
B	Corrodes ("burns") skin/materials	No damage to skin/materials
C	Feels soapy	Feels soapy
D	Corrodes ("burns") skin/materials	Corrodes ("burns") skin/materials

7 Which energy profile represents the reaction that is most highly endothermic?

(Vertical axis: energy, horizontal axis: reaction path)

1



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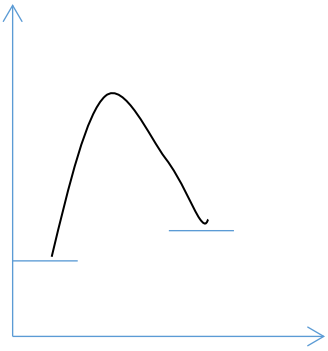

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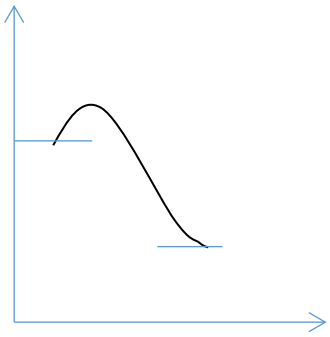

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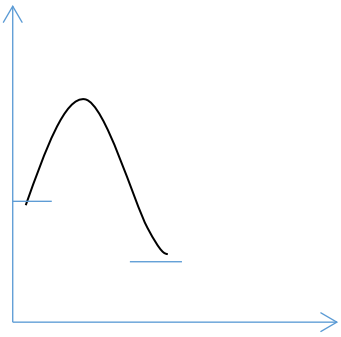

A 1

B 2

C 3

D 4

8 Why does a candle decrease in mass as the candle burns?

A The flame melts the wax which evaporates into the air.

B The wax melts, goes up the wick and into the flame.

C The wick burns allowing the wax to evaporate.

D The wax burns in air so forms new substances.

9 When fuels such as petrol, natural gas, coal and butane burn, energy is released. Where does the energy come from?

A The Sun, because all fossil fuels store the sun's energy.

B The fuel reacting with oxygen in the air.

C The fuel, because it is an energy store.

D The flame, because this is what is actually burning.

10 The reaction between hydrogen and nitrogen reaches equilibrium in a closed system:

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ ΔH = –ve

What happens if the temperature of the system is increased?

A The reaction moves to the right.

B The reaction moves to the left.

C Nothing happens because the system is in equilibrium.

D Both forward and reverse reactions speed up at the same rate.

11 A brand new football is pumped up until it is hard. It is played with, then left outside on a cold night. In the morning it has gone soft. What is the best explanation for this observation?

A Air particles in the football stop moving when it's cold.

B Air particles have escaped from the football.

C Air particles move less quickly in cold temperatures.

D Air pressure in the ball goes down in cold temperatures.

12 Which list contains only empirical formulae?

A C_3H_6, I_4O_{10}, Al_2Cl_6

B CH_2, P_2O_5, MgO

C C_3H_4, C_2H_6, $C_{12}H_{22}O_{11}$

D P_4O_{10}, Al_2Cl_6, MgO

13 The equation for the reaction between hydrogen and oxygen is:

$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$ $\Delta H = -286$ kJ mol^{-1}

The reaction is exothermic.

In what process is energy released?

A Breaking down the hydrogen molecules.

B Breaking down the oxygen molecules.

C Making the water molecules.

D Breaking down the hydrogen and oxygen molecules.

14 Which statement best explains what happens when a solid is heated and changes state into a liquid?

A Solid particles melt into liquid particles.

B Solid particles change shape and become liquid.

C Particles in the liquid can move around more.

D The mass goes down as some particles are lost.

15 Here is the equation for the reaction between methane and oxygen:

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$ $\Delta H = -ve$

What does "$\Delta H = -ve$" mean?

A Overall, energy is absorbed from the environment to make the reaction occur.

B Overall, energy is given out to the environment from the reaction.

C The forward reaction is endothermic.

D The reverse reaction is exothermic.

16 In a closed fizzy-drink bottle an equilibrium position exists between carbon dioxide gas in the head space above the drink and carbon dioxide in the drink itself:

$CO_2(g) \rightleftharpoons CO_2(aq)$

What happens to the equilibrium position when the bottle is opened, some drink is poured out and the bottle is closed?

A It shifts to the left, as the reverse reaction is favoured.

B It shifts to the right as the forward reaction is favoured.

C There is no change as the previous equilibrium position is re-established.

D There is no change as both reactions continue as before.

17 An equation representing petrol burning in a car engine is:

$2C_8H_{18}(l) + 25O_2(g) \rightarrow 16CO_2(g) + 18H_2O(g)$

Why does a car stop when its petrol tank is empty?

A The reaction has reached completion.

B Incomplete combustion occurs.

C The reaction has reached equilibrium.

D The oxygen supply to the engine closes off.

18 Which of these statements about the properties of alkaline solutions is correct?

A Alkaline solutions turn blue litmus indicator paper red.

B Alkaline solutions react with acids to produce hydrogen gas.

C Alkaline solutions turn red litmus indicator paper blue.

D Alkaline solutions react with metals to produce hydrogen gas.

19 The reaction between solid silver, iron(III) ions, silver ions and iron(II) ions is shown in the equation:

$Ag(s) + Fe^{3+}(aq) \rightleftharpoons Ag^{+}(aq) + Fe^{2+}(aq)$

The reaction is an equilibrium reaction.

Which is the best statement that explains the term "equilibrium reaction"?

A There is no observable change once equilibrium is reached.

B First one reaction happens, then the other, and this keeps on going.

C The reaction is balanced overall between the two sides.

D The amounts of reactants and products are equal.

20 Which list comprises three factors which may affect the rate of a chemical reaction?

A Concentration, surface area, temperature

B Temperature, volume of gas produced, concentration

C Concentration, surface area, particle speed

D Volume of gas produced, surface area, temperature

21 Which of these can be used to separate the components of a compound?

A Filtering

B Electrolysis

C You can't separate what's in a compound.

D Chromatography

22 Which statement best describes *collision theory*?

Reactions occur when ….

A … particles have reached the initiation temperature for the reaction.

B … particles collide, provided they have a certain minimum kinetic energy.

C … the combined energy of a particle collision equals or exceeds activation energy.

D … kinetic energy is transferred to the collision, enabling new chemical bonds to form.

23 Why is ice hard, while liquid water is runny?

A Water particles can't move in ice, making it hard.

B Water particles move around more than in ice.

C Ice is colder than liquid water.

D Bonds between particles in ice are stronger than in water.

24 Which statement describes a "chemical element" best?

A An element has a melting point over 200 °C and dissolves in water.

B An element can only be split by chromatography.

C An element is a pure, single chemical.

D An element is made up of identical particles made up of only one kind of atom.

25 When carbon is burned in a limited supply of air carbon monoxide is formed. What mass of carbon monoxide is produced from 3 g of carbon?

$C + 0.5O_2 \rightarrow CO$

A_r values: C = 12; O = 16

A 3.5 g

B 3 g

C 7 g

D 14 g

26 Which of these statements about particles in a gas is true?

A A gas is not made of particles.

B Particles in a gas are far apart from each other.

C Gas particles can be squeezed easily.

D The particles expand if the gas is heated.

27 What are the units for relative molecular mass, M_r?

A Atomic mass units

B g^{-9}

C kg^{-12}

D There are no units for relative molecular mass.

28 Which response shows how many moles of substance are present in:

132 g carbon dioxide

36 kg water

7.3 g sulfur hexafluoride, SF_6?

A_r values: C = 12, O = 16, H = 1, S = 32, F = 19

	Carbon dioxide	Water	Sulfur hexafluoride
A	3	1	1.4
B	4.7	2	1.4
C	3	2000	0.05
D	0.33	0.5	20

29 A glass-blower heats up a piece of glass in a furnace. She blows the molten glass into shape. The glass cools to a rigid structure. Which is the best explanation for why this happens?

A The glass loses heat to the atmosphere.

B Glass particles lose heat and stop moving.

C Glass particles lose heat and move less.

D Glass particles shrink as they cool down.

30 Which of the following best describes a strong acid?

A A solution that is very corrosive.

B An acidic solution that is very concentrated.

C An acid which is fully ionised in solution.

D A solution with a pH lower than 3.

31 When magnesium ribbon is added to dilute sulfuric, a reaction occurs:

$H_2SO_4(aq) + Mg(s) \rightarrow MgSO_4(aq) + H_2(g)$

Which is the best method of measuring the rate of reaction?

A Record the change in mass of magnesium over time.

B Record the change in concentration of the acid over time.

C Record the volume of hydrogen gas produced over time.

D Record the total volume of hydrogen produced.

32 Choose the list that includes only gases that are compounds:

A Methane, carbon dioxide, steam

B Ammonia, krypton, methane

C Steam, air, ammonia

D Carbon dioxide, krypton, air