Chemical Reactions – 2019 June

1. 0620/11/M/J/19/No.12

Which process is a physical change?

A burning wood

B cooking an egg

C melting an ice cube

D rusting iron

2. 0620/11/M/J/19/No.13

Hydrogen peroxide solution decomposes very slowly at room temperature to produce oxygen gas. This gas forms a rising foam when liquid detergent is added.

Five test-tubes are half filled with hydrogen peroxide solution. A drop of liquid detergent is added to each one.

Different metal oxides are added to four of the test-tubes and the height of the foam formed after 1 minute is measured. The results are shown.

metal oxide	height of foam / cm
no metal oxide added	0.1
aluminium oxide	0.1
calcium oxide	0.2
copper(II) oxide	2.3
manganese(IV) oxide	5.4

Which conclusion can be drawn from these results?

A Metal oxides do not affect the rate of this reaction.

B All metal oxides increase the rate of this reaction and act as catalysts.

C Manganese(IV) oxide is the best catalyst of the four metal oxides tested.

D Only transition element oxides increase the rate of this reaction.

3. 0620/11,12,13,21,22,23/M/J/19/No.14

When blue-green crystals of nickel(II) sulfate are heated, water is produced and a yellow solid remains. When water is added to the yellow solid, the blue-green colour returns.

Which process describes these changes?

A combustion

B corrosion

C neutralisation

D reversible reaction

4. 0620/11/M/J/19/No.15

In a blast furnace, iron is extracted when iron(III) oxide reacts with carbon monoxide.

The equation is shown.

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

Which substance is oxidised and which is reduced?

	oxidised	reduced
A	CO	Fe_2O_3
B	CO_2	Fe
C	Fe	CO_2
D	Fe_2O_3	CO

5. 0620/12/M/J/19/No.12

Which process is a physical change?

A a firework exploding

B burning wood

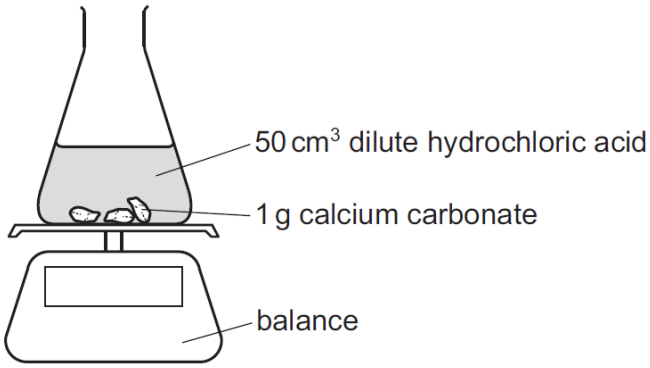
C chocolate melting

D iron rusting

6. 0620/12/M/J/19/No.13

An experiment is set up as shown.

The mass of the conical flask and its contents is measured at 30 second intervals.



Which statement about the reaction and about changes to the reaction conditions is correct?

A Adding 10 cm^3 of water to the 50 cm^3 of acid increases the rate of the reaction.

B Increasing the size of the pieces of calcium carbonate increases the rate of the reaction.

C Increasing the temperature increases the rate of the reaction.

D The mass of the conical flask increases as carbon dioxide is formed.

7. 0620/12/M/J/19/No.15

Different types of reaction are listed.

1 oxidation

2 decomposition

3 combustion

4 reduction

The equation shows the reaction of magnesium with oxygen.

$$2Mg + O_2 \rightarrow 2MgO$$

Which types of reaction does magnesium undergo in this reaction?

A 1 and 3 **B** 1 only **C** 2 and 4 **D** 4 only

8. 0620/13/M/J/19/No.12

Which process is a physical change?

A burning magnesium in air

B dissolving sodium chloride in water

C adding magnesium to hydrochloric acid

D heating green copper(II) carbonate until it turns black

9. 0620/13/M/J/19/No.13

A student reacts strips of zinc with dilute sulfuric acid and measures the time taken to produce 100 cm^3 of hydrogen.

The experiment is repeated using different conditions.

The results are shown in the table.

experiment	time to produce 100 cm^3 of hydrogen / s
1	250
2	100

Which changes in conditions produce the results shown in experiment 2?

1 Add a catalyst.

2 Dilute the acid.

3 Use zinc powder.

4 Heat the acid.

A 1, 3 and 4 only

B 1 and 4 only

C 2 and 3 only

D 2 and 4 only

10. 0620/13/M/J/19/No.15

Zinc is formed when zinc oxide is heated with carbon.

$$\text{zinc oxide} + \text{carbon} \rightarrow \text{zinc} + \text{carbon monoxide}$$

Which substance is oxidised in this reaction?

A carbon

B carbon monoxide

C zinc

D zinc oxide

11. 0620/21/M/J/19/No.13

Which change in reaction conditions increases both the collision rate and the proportion of molecules with sufficient energy to react?

A addition of a catalyst

B increasing the concentration of a reactant

C increasing the surface area of a reactant

D increasing the temperature of the reaction

12. 0620/21/M/J/19/No.16

Which changes represent oxidation?

1 $2I^- \rightarrow I_2 + 2e^-$

2 $Cr(VI) \rightarrow Cr(III)$

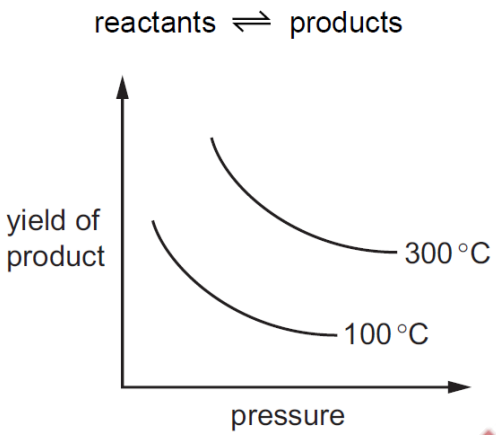
3 $Fe(II) \rightarrow Fe(III)$

A 1 and 2 **B** 1 and 3 **C** 1 only **D** 2 only

13. 0620/21/M/J/19/No.15

The graph shows how the yield of product in a reversible reaction changes as the temperature and pressure are changed.

All reactants and products are gases.



Which row is correct for this reversible reaction?

	side of reaction with fewer moles	forward reaction
A	reactant	exothermic
B	reactant	endothermic
C	product	endothermic
D	product	exothermic

14. 0620/22/M/J/19/No.18

Which change in reaction conditions increases both the collision rate and the proportion of molecules with sufficient energy to react?

A addition of a catalyst

B increasing the concentration of a reactant

C increasing the surface area of a reactant

D increasing the temperature of the reaction

15. 0620/22/M/J/19/No.15

The equation for the manufacture of ethanol is shown.

$$\underset{\text{ethene}}{C_2H_4(g)} + \underset{\text{steam}}{H_2O(g)} \rightleftharpoons \underset{\text{ethanol}}{C_2H_5OH(g)}$$

What is the effect of doubling the pressure on this reaction?

A decreases the rate of formation of ethanol

B increases the yield of ethene

C decreases the rate of formation of ethene

D increases the yield of ethanol

16. 0620/22/M/J/19/No.16

The ionic equation for the reaction of aqueous potassium bromide with chlorine gas is shown.

$$2Br^- + Cl_2 \rightarrow Br_2 + 2Cl^-$$

Which statement is correct?

A Bromide ions are oxidised by gaining electrons.

B Bromide ions are oxidised by losing electrons.

C Chlorine is oxidised by gaining electrons.

D Chlorine is oxidised by losing electrons.

17. 0620/23/M/J/19/No.13

Which change in reaction conditions increases both the collision rate and the proportion of molecules with sufficient energy to react?

A addition of a catalyst

B increasing the concentration of a reactant

C increasing the surface area of a reactant

D increasing the temperature of the reaction

18. 0620/23/M/J/19/No.15

A reaction between nitrogen and oxygen is shown. The forward reaction is endothermic.

$$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$$

Which change increases the equilibrium yield of nitrogen monoxide, NO?

A decreasing the pressure

B decreasing the temperature

C increasing the pressure

D increasing the temperature

19. 0620/23/M/J/19/No.16

Which changes represent reduction?

1 $Cl_2 + 2e^- \rightarrow 2Cl^-$

2 $Mn(VII) \rightarrow Mn(II)$

3 $sulfate(IV) \rightarrow sulfate(VI)$

A 1 and 2 **B** 1 and 3 **C** 1 only **D** 2 only

20. 0620/12/F/M/19/No.12

Which process involves a chemical change?

A dissolving copper(II) sulfate

B distilling ethanol

C freezing water

D neutralising copper(II) oxide

21. 0620/12/F/M/19/No.13

Lumps of limestone react with dilute hydrochloric acid according to the equation shown.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

Which change in conditions decreases the rate of the reaction?

A increase the concentration of the acid

B increase the volume of the acid

C increase the size of the lumps of limestone

D increase the temperature

22. 0620/12/F/M/19/No.14

Which reaction is reversible?

A $Cu + ZnSO_4 \rightarrow CuSO_4 + Zn$

B $CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$

C $CuO + H_2 \rightarrow Cu + H_2O$

D $CuSO_4 \cdot 5H_2O \rightarrow CuSO_4 + 5H_2O$

23. 0620/12/F/M/19/No.15

The reaction between magnesium and carbon dioxide is shown in the equation.

$$2Mg + CO_2 \rightarrow 2MgO + C$$

Which statement describes what happens in this reaction?

A Carbon is oxidised.

B Magnesium is reduced.

C Neither oxidation nor reduction happens.

D The carbon in carbon dioxide is reduced.

24. 0620/22/F/M/19/No.15

A student adds dilute hydrochloric acid at two different temperatures to two different lumps of limestone. The lumps of limestone have the same mass.

The carbon dioxide gas produced is collected in a gas syringe.

The volume of carbon dioxide collected in 1 minute at each temperature is shown.

temperature / °C	volume of carbon dioxide produced in 1 minute / cm^3
25	10
50	40

Which row describes and explains the results obtained at 50 °C compared with 25 °C?

	reaction rate	energy of collisions
A	higher	lower
B	higher	higher
C	lower	lower
D	lower	higher

25. 0620/22/F/M/19/No.16

Which reaction is reversible?

A $Cu + ZnSO_4 \rightarrow CuSO_4 + Zn$

B $CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$

C $CuO + H_2 \rightarrow Cu + H_2O$

D $CuSO_4 \cdot 5H_2O \rightarrow CuSO_4 + 5H_2O$

26. 0620/22/F/M/19/No.17

Some nitrogen dioxide gas was put in a gas syringe. The end of the gas syringe is sealed.

A reversible reaction occurs. The reaction reaches equilibrium.

$$\underset{\text{dark brown}}{2NO_2(g)} \rightleftharpoons \underset{\text{light yellow}}{N_2O_4(g)}$$

The forward reaction is exothermic.

Which statement about the reaction is correct?

A If the gas syringe is placed in a cold water bath, the colour becomes darker.

B If the gas syringe is placed in a hot water bath, the colour becomes lighter.

C If the volume in the gas syringe is increased, the colour becomes lighter.

D If the volume in the gas syringe is decreased, the colour becomes lighter.

27. 0620/22/F/M/19/No.18

The reaction between magnesium and carbon dioxide is shown in the equation.

$$2Mg + CO_2 \rightarrow 2MgO + C$$

Which statement describes what happens in this reaction?

A Carbon is oxidised.

B Magnesium is reduced.

C Neither oxidation nor reduction happens.

D The carbon in carbon dioxide is reduced.

28. 0620/22/F/M/19/No.19

Which changes involve reduction?

1 $2I^- \rightarrow I_2 + 2e^-$

2 $CuO + H_2 \rightarrow Cu + H_2O$

3 $Al^{3+} + 3e^- \rightarrow Al$

4 $Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4