01 Matter, Mixtures and Separation

Set A Concept Practice

Name	Time 45 minutes	Total 36 marks	Score ____ / 36

A From the lesson

19 MARKS

1 Which of these is a mixture?

A water **B** carbon dioxide **C** air **D** oxygen

/1

Answer ☐ [1]

Learners' Alley, Matter, Mixtures and Separation slides

2 What happens to the temperature of a pure liquid while it boils?

A it rises steadily **B** it falls

C it stays constant **D** it rises, then falls

/1

Answer ☐ [1]

Learners' Alley, Matter, Mixtures and Separation slides

3 Which gas diffuses fastest at the same temperature? Relative molecular masses: chlorine 71, carbon dioxide 44, helium 4, oxygen 32.

A chlorine **B** carbon dioxide **C** helium **D** oxygen

/1

Answer ☐ [1]

Learners' Alley, Matter, Mixtures and Separation slides

4 Which separation method gives a pure solid from a solution of a substance that decomposes on heating?

A evaporation to dryness **B** crystallisation

C simple distillation **D** sieving

/1

Answer ☐ [1]

Learners' Alley, Matter, Mixtures and Separation slides

5 A spot has an R_f of 0.40. The solvent front moved 10.0 cm. How far did the spot move?

A 2.5 cm **B** 4.0 cm **C** 6.0 cm **D** 25 cm

/1

Answer ☐ [1]

Learners' Alley, Matter, Mixtures and Separation slides

6 Salt dissolves in water.

(a) Name the solute and the solvent.

.....

[1]

(b) Why is the solution called aqueous?

.....

[1]

/2

Learners' Alley, Matter, Mixtures and Separation slides

7 **(a)** Sparkling water is water and carbon dioxide. Is it a compound or a mixture? Explain.

.....

.....

[1]

(b) Name one element in air that exists as single atoms, one element that exists as molecules, and one compound in air.

.....

.....

[1]

/2

Learners' Alley, Matter, Mixtures and Separation slides

8 Dry ice, solid carbon dioxide, sublimes at room temperature. Describe what happens to its particles, and explain why the gas takes up much more space than the solid.

.....

.....

.....

[2]

/2

Learners' Alley, Matter, Mixtures and Separation slides

9 Why does the smell of cooking spread faster in a warm kitchen?

.....

.....

[1]

/1

Learners' Alley, Matter, Mixtures and Separation slides

10 **(a)** Name two separation methods in which a component changes state.

.....

[1]

(b) How do you decide which separation method to use?

.....

.....

[1]

Learners' Alley, Matter, Mixtures and Separation slides

/2

11 In paper chromatography, why is the start line drawn in pencil and not in ink?

.....

..... **[1]**

/1

Learners' Alley, Matter, Mixtures and Separation slides

12 **(a)** The same substance is run in the same solvent at the same temperature for 10 minutes and for 20 minutes. Do the R_f values differ? Explain.

.....

..... **[1]**

(b) Why can an R_f value found in ethanol not be compared with one found in water?

..... **[1]**

/2

Learners' Alley, Matter, Mixtures and Separation slides

13 **(a)** Liquid P boils over the range 130 °C to 140 °C. What does this tell you about P?

..... **[1]**

(b) Name two ways to test whether a solid is pure.

.....

..... **[1]**

/2

Learners' Alley, Matter, Mixtures and Separation slides

B Practice

17 MARKS

14 Substances can be classified as elements, compounds or mixtures. Which underlined substance best represents a mixture?

A <u>black powder</u> burns in air to form a colourless gas as the only product

B <u>green powder</u> leaves a black residue and a colourless gas upon heating

C <u>grey solid</u> that conducts electricity

D <u>white solid</u> that melts from 56 °C to 58 °C

Answer ☐ **[1]**

/1

2024 NASS O Prelim P1-P2 Q8

15 A student made four statements about elements, compounds and mixtures.

statement 1: Elements are made up of only one type of atom.
statement 2: Compounds have similar properties to the elements they are made of.

statement 3: Little or no energy change is involved when a compound is formed.
statement 4: Mixtures have a fixed ratio of components.

How many of the above statements are correct?

A one **B** two **C** three **D** four

Answer [1]

/1

2024 AES O Prelim P1 Q10

16 A new substance was discovered, and a series of experiments were conducted on it. Which observation suggests that the substance **cannot** be an element?

A It has a fixed boiling point.

B It dissolves in water to form a yellow-green solution.

C When heated strongly, a brown solid and a yellow gas are produced.

D When heated in air, it can form oxides with two different chemical formulae.

Answer [1]

/1

2024 Serangoon O Prelim P1 Q4

17 The conical flask contains compound X which is present in liquid and gaseous states. Which statement is correct?

A Energy is gained when X changes from liquid to gas.

B In gaseous state a molecule of compound X has a smaller mass than in liquid state.

C Liquid X sublimed to form gaseous X.

D Molecules of liquid X vibrate about in fixed positions.

Answer [1]

/1

Source: 2024 Compassvale O Prelim P1 Q4

18 The rate of diffusion of gas P (M_r = 32) and gas Q (M_r = 64) was compared at 30 °C and 60 °C. Which would have the slowest rate of diffusion?

A gas P at 30 °C **B** gas P at 60 °C

C gas Q at 30 °C **D** gas Q at 60 °C

Answer [1]

/1

Source: 2022 CHIJ St Nicholas O EOY P1 Q2

19 What happens to the molecules when steam condenses to form water?

A The molecules gain energy and move faster.

B The molecules lose energy and become smaller.

C The molecules lose energy and move closer together.

D The molecules gain energy and break up to form atoms.

Answer [1]

/1

Source: 2024 Temasek O Prelim P1 Q5

20 Dry ice sublimes at −78 °C. Which statement describes what happens to dry ice at 0

A The carbon dioxide particles become closely packed.

B The carbon dioxide particles become far apart.

C The carbon dioxide particles become smaller.

D The carbon dioxide particles lose energy to the surroundings.

/1

Answer [1]

Source: 2024 SMSS O Sec3 P1 Q3

21 A mixture is made up of two liquids whose boiling points differ by 52.5 °C. What other information about the liquids is necessary to identify the appropriate method to separate them?

A their colours

B their densities

C their melting points

D their miscibility

/1

Answer [1]

Source: 2024 Bukit View O Prelim P1 Q2

22 Which statement is correct?

A A filtrate is a substance that remains on the filter paper after filtration.

B A saturated solution has the maximum amount of solvent dissolved in the solute.

C A solution is a compound produced when a solute reacts with a solvent.

D A substance that remains in the heated flask after distillation is called a residue.

/1

Answer [1]

Source: 2024 SKSS O Prelim P1 Q1

23 The table shows some mixtures and their constituents obtained using suitable separation techniques.

	mixture	constituent obtained
1	aqueous sodium chloride	water
2	solid iodine and solid nickel	solid iodine
3	aqueous sodium chloride	solid sodium chloride

Which row gives the correct separation techniques to obtain the constituents from the mixture? Each option gives the technique for 1, 2 and 3 in that order.

A distillation, sublimation, evaporation

B distillation, sublimation, filtration

C filtration, crystallisation, evaporation

D sublimation, crystallisation, filtration

/1

Answer [1]

Source: 2024 Bukit View O Prelim P1 Q4

24 The boiling points of four substances found in air are given in the table.

substance	boiling point / °C
argon	−186
carbon dioxide	−78 (sublimes)
nitrogen	−196

oxygen	−183

Air is cooled to −190 °C such that some substances condense into liquid. When the temperature is then raised, which liquid would turn into a gas first?

A argon **B** carbon dioxide **C** nitrogen **D** oxygen

/1

Answer [1]

Source: 2024 BMSS O Prelim P1 Q4

25 Which statement about chromatography is correct?

A Each substance has its own unique R_f value in chromatography.

B Locating agents are needed to identify the colours present in ink.

C The start line has to be below the solvent level.

D The R_f value is a ratio of the distance travelled by a component to the solvent front.

/1

Answer [1]

Source: 2026 Dunman O Prelim P1 Q1

26 The table gives the results of chromatography experiments that were carried out on some known food colours, using the same solvent.

food colour	distance from start line to solvent front / mm	distance moved by food colour spot / mm
Ponceau 4R	60	42
Carmoisine	74	45
Fast red	67	27
Erythrosine	58	17

Which food colour is the most soluble in the solvent used?

A Ponceau 4R **B** Carmoisine **C** Fast red **D** Erythrosine

/1

Answer [1]

Source: 2024 SCGS O Prelim P1 Q3

27 A chemist is given an unknown white powder. What should the chemist do to determine the purity of the unknown substance?

A burn it in excess oxygen

B conduct a solubility test in water

C measure its melting point

D pass electricity through it

/1

Answer [1]

Source: 2024 Jurongville O Prelim P1 Q5

28 A liquid is suspected to be pure ethanol. What is the best way to test its purity?

A burn it completely in oxygen

B measure its boiling point

C react it with ethanoic acid

D test it with litmus paper

/1

Answer [1]

Source: 2025 CCHY O Prelim P1 Q5

29 Which substance should be pure for the intended use?

A a drug for curing diseases

B aluminium for making airplane bodies

C petrol for car fuels

D tap water for human consumption

/1

Answer [1]

Source: 2023 Catholic High School O Prelim P1 Q4

30 An impure sample of compound X has a melting point of around 120 °C. X is purified and its melting point is measured again. Which row is correct? Each option gives the method of purification, then the melting point of pure X.

A crystallisation, 115 °C

B crystallisation, 125 °C

C distillation, 115 °C

D distillation, 125 °C

/1

Answer [1]

Source: 2026 KSS O Prelim P1 Q3