3.2 Chemistry: Materials: 1-hour Pack

ISEB CE 13+ Science (Chemistry) · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Which of these is a mixture?

- [ ] A) oxygen
- [ ] B) gold
- [ ] C) ink
- [ ] D) hydrogen
- [ ] E) ammonia

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2 Which of these elements is NOT a metal?

- [ ] A) tin
- [ ] B) copper
- [ ] C) magnesium
- [ ] D) hydrogen
- [ ] E) lead

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3 Which statement is true of a liquid?

- [ ] A) it can be poured and has a fixed volume
- [ ] B) it has a fixed shape
- [ ] C) it has neither a fixed shape nor a fixed volume
- [ ] D) it can be compressed easily
- [ ] E) it keeps its shape without a container

---

4 Which of these substances is NOT a gas at room temperature?

- [ ] A) argon
- [ ] B) water
- [ ] C) nitrogen
- [ ] D) helium
- [ ] E) oxygen

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5 An alloy is made by mixing copper and tin in the ratio 5:2 by mass. The total alloy mass is 350 g. Calculate the mass of tin used.

(1)

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6 A solid block has a mass of 27.5 g and a volume of 55 cm^3. Calculate its density in g/cm3.

- [ ] A) 2 g/cm3
- [ ] B) 82.5 g/cm3
- [ ] C) 5 g/cm3
- [ ] D) 1512.5 g/cm3
- [ ] E) 0.5 g/cm3

---

7 Which of these elements is NOT a metal?

- [ ] A) magnesium
- [ ] B) aluminium
- [ ] C) bromine
- [ ] D) calcium
- [ ] E) lead

---

8 Which statement is true of a solid?

- [ ] A) it can be poured and has a fixed volume
- [ ] B) its particles are packed in a regular pattern
- [ ] C) its particles are close together but arranged randomly
- [ ] D) it takes the shape of its container but keeps a fixed volume
- [ ] E) its particles are far apart and move quickly in all directions

---

9 Which of these substances is a solid at room temperature?

- [ ] A) argon
- [ ] B) chlorine
- [ ] C) nitrogen
- [ ] D) copper
- [ ] E) bromine

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10 A group of pupils collect a sample of water from a stream. The water contains fine sediment and dissolved salts. Name the technique they could use to recover the solid salt from this water after removing the sediment.

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(1)

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11 A sample of material has a mass of 25 g and a density of 5 g/cm3. Calculate its volume in cm3.

- ☐ A) 20 cm^3
- ☐ B) 0.2 cm^3
- ☐ C) 125 cm^3
- ☐ D) 50 cm^3
- ☐ E) 5 cm^3

---

12 Which of these is NOT a compound?

- ☐ A) crude oil
- ☐ B) methane
- ☐ C) ammonia
- ☐ D) magnesium oxide
- ☐ E) sodium chloride

---

13 Which statement is true of a gas?

- ☐ A) its particles are close together but can slide past one another
- ☐ B) its particles are held in fixed positions and can only vibrate
- ☐ C) its particles are packed in a regular pattern
- ☐ D) it can be poured and has a fixed volume
- ☐ E) its particles are far apart and move quickly in all directions

---

14 Which of these substances is a solid at room temperature?

- ☐ A) bromine
- ☐ B) helium
- ☐ C) sulfur
- ☐ D) water
- ☐ E) hydrogen

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15 Name a technique that could be used to separate the amino acids in a mixture of proteins that have been broken down.

(1)

16 A solid block has a mass of 445 g and a density of 8.9 g/cm3. Calculate its volume in cm3.

- A) 436.1 cm^3
- B) 50 cm^3
- C) 0.02 cm^3
- D) 500 cm^3
- E) 3960.5 cm^3

17 Which of these is NOT an element?

- A) air
- B) sulfur
- C) helium
- D) gold
- E) copper

18 Which of these elements is a metal?

- A) tin
- B) helium
- C) oxygen
- D) nitrogen
- E) sulfur

19 Which statement is NOT true of a solid?

- A) it keeps its shape without a container
- B) it has a fixed shape
- C) its particles are packed in a regular pattern
- D) its particles are held in fixed positions and can only vibrate
- E) it can be compressed easily

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20 Solder is an alloy made by mixing lead and tin. A technician makes 180 g of solder using lead and tin in the ratio 3:5 by mass. Calculate the mass of lead used.

(1)

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21 A metal object has a mass of 375 g and a density of 5 g/cm3. Calculate its volume in cm3.

- ☐ A) 750 cm^3
- ☐ B) 75 cm^3
- ☐ C) 370 cm^3
- ☐ D) 7.5 cm^3
- ☐ E) 1875 cm^3

---

22 Which of these is NOT an element?

- ☐ A) hydrogen
- ☐ B) oxygen
- ☐ C) magnesium oxide
- ☐ D) nitrogen
- ☐ E) sulfur

---

23 Which of these elements is a non-metal?

- ☐ A) calcium
- ☐ B) silver
- ☐ C) phosphorus
- ☐ D) lead
- ☐ E) magnesium

---

24 Which statement is NOT true of a solid?

- ☐ A) it has a fixed shape
- ☐ B) its particles are packed in a regular pattern
- ☐ C) it keeps its shape without a container
- ☐ D) its particles are held in fixed positions and can only vibrate
- ☐ E) its particles are far apart and move quickly in all directions

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25 Which of these substances is a gas at room temperature?

- [ ] A) sulfur
- [ ] B) gold
- [ ] C) mercury
- [ ] D) hydrogen
- [ ] E) magnesium

---

26 A solid block has a mass of 240 g and a volume of 80 cm^3. Calculate its density in g/cm3.

- [ ] A) 3 g/cm3
- [ ] B) 30 g/cm3
- [ ] C) 320 g/cm3
- [ ] D) 19200 g/cm3
- [ ] E) 160 g/cm3

---

27 Which of these is NOT a compound?

- [ ] A) calcium carbonate
- [ ] B) carbon
- [ ] C) sodium chloride
- [ ] D) water
- [ ] E) methane

---

28 Which of these elements is a non-metal?

- [ ] A) silver
- [ ] B) magnesium
- [ ] C) potassium
- [ ] D) aluminium
- [ ] E) chlorine

---

29 Which statement is NOT true of a liquid?

- [ ] A) it has neither a fixed shape nor a fixed volume
- [ ] B) its particles are close together but arranged randomly
- [ ] C) it can be poured and has a fixed volume
- [ ] D) it takes the shape of its container but keeps a fixed volume
- [ ] E) its particles are close together but can slide past one another

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30 Which of these substances is a gas at room temperature?

- ☐ A) iodine
- ☐ B) iron
- ☐ C) copper
- ☐ D) methane
- ☐ E) aluminium

---

31 An alloy contains tin and copper in the ratio 2:8 by mass. If 200 g of alloy is made, calculate the mass of tin used.

(1)

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32 Which of these is NOT a compound?

- ☐ A) ammonia
- ☐ B) magnesium oxide
- ☐ C) air
- ☐ D) methane
- ☐ E) iron oxide

---

33 Which of these elements is a metal?

- ☐ A) argon
- ☐ B) helium
- ☐ C) chlorine
- ☐ D) sodium
- ☐ E) phosphorus

---

34 Which statement is NOT true of a solid?

- ☐ A) it has a fixed shape
- ☐ B) it can be poured and has a fixed volume
- ☐ C) its particles are packed in a regular pattern
- ☐ D) it keeps its shape without a container
- ☐ E) its particles are held in fixed positions and can only vibrate

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35 Which of these substances is a solid at room temperature?

- [ ] A) potassium
- [ ] B) ethanol
- [ ] C) oxygen
- [ ] D) water
- [ ] E) mercury

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36 Bronze is an alloy of copper and tin. A sculptor makes 300 g of bronze using copper and tin in the ratio 9:1 by mass. Calculate the mass of copper used.

(1)

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37 A stone has a mass of 735 g and a volume of 70 cm^3. Calculate its density in g/cm3.

- [ ] A) 51450 g/cm3
- [ ] B) 665 g/cm3
- [ ] C) 105 g/cm3
- [ ] D) 805 g/cm3
- [ ] E) 10.5 g/cm3

---

38 Which of these is NOT an element?

- [ ] A) carbon
- [ ] B) hydrogen
- [ ] C) crude oil
- [ ] D) copper
- [ ] E) sulfur

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39 Which of these elements is a metal?

- [ ] A) carbon
- [ ] B) bromine
- [ ] C) calcium
- [ ] D) oxygen
- [ ] E) nitrogen

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40 Which statement is true of a solid?

- ☐ A) it can be compressed easily
- ☐ B) it has a fixed shape
- ☐ C) its particles are far apart and move quickly in all directions
- ☐ D) it takes the shape of its container but keeps a fixed volume
- ☐ E) its particles are close together but can slide past one another

---

41 Which of these substances is NOT a solid at room temperature?

- ☐ A) calcium
- ☐ B) zinc
- ☐ C) iodine
- ☐ D) hydrogen
- ☐ E) aluminium

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42 A sample of salt water has been filtered to remove sand. Name the technique that could be used to obtain white salt crystals from the filtered salt water.

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(1)

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43 A stone has a mass of 280 g and a volume of 70 cm^3. Calculate its density in g/cm3.

- ☐ A) 350 g/cm3
- ☐ B) 19600 g/cm3
- ☐ C) 210 g/cm3
- ☐ D) 0.25 g/cm3
- ☐ E) 4 g/cm3

---

44 Which of these is NOT a compound?

- ☐ A) hydrogen
- ☐ B) methane
- ☐ C) ammonia
- ☐ D) carbon dioxide
- ☐ E) magnesium oxide

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45 Which of these elements is a metal?

- ☐ A) chlorine
- ☐ B) carbon
- ☐ C) helium
- ☐ D) gold
- ☐ E) oxygen

---

46 Which of these substances is NOT a gas at room temperature?

- ☐ A) oxygen
- ☐ B) sodium
- ☐ C) chlorine
- ☐ D) hydrogen
- ☐ E) carbon dioxide

---

47 A laboratory is given a sample of seawater containing suspended particles. Name the physical separation technique that should be used to remove the solid particles while keeping the liquid.

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(1)

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48 Brass is an alloy made by mixing copper and zinc. A jeweller makes 250 g of brass using copper and zinc in the ratio 7:3 by mass.

(a) Calculate the mass of copper used. **(2)**

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(b) Calculate the mass of zinc used. **(1)**

.....

(c) Explain why brass (an alloy) is harder than pure copper. **(2)**

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49 A stone has a density of 2.7 g/cm3 and a volume of 10 cm^3. Calculate its mass in g.

- [ ] A) 2.7 g
- [ ] B) 0.27 g
- [ ] C) 27 g
- [ ] D) 12.7 g
- [ ] E) 270 g

---

50 Which of these is a compound?

- [ ] A) nitrogen
- [ ] B) granite
- [ ] C) soil
- [ ] D) brass
- [ ] E) ammonia

---

51 Which of these elements is NOT a metal?

- [ ] A) neon
- [ ] B) lead
- [ ] C) iron
- [ ] D) tin
- [ ] E) aluminium

---

52 Which statement is true of a liquid?

- [ ] A) its particles are far apart and move quickly in all directions
- [ ] B) its particles are packed in a regular pattern
- [ ] C) its particles are close together but can slide past one another
- [ ] D) it has neither a fixed shape nor a fixed volume
- [ ] E) it fills any container completely

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53 After removing impurities from a sugar solution, a technique is needed to recover solid sugar crystals. Name this separation technique.

(1)

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54 A solid block has a density of 2.5 g/cm3 and a volume of 30 cm^3. Calculate its mass in g.

- ☐ A) 750 g
- ☐ B) 32.5 g
- ☐ C) 7.5 g
- ☐ D) 12 g
- ☐ E) 75 g

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55 A pupil heats a solid substance from -10C and records its temperature every two minutes. Some of her results are shown in the table below.
Time (min): 0, 2, 4, 6, 8, 10, 12
Temperature (C): -10, 0, 0, 0, 10, 20, 30

Time (min)	Temperature (C)
0	-10
2	0
4	0
6	0
8	10
10	20
12	30

(a) Use the data to state the melting point of the substance. **(1)**

(b) Explain, in terms of energy and particles, why the temperature stays constant between 2 and 6 minutes even though the substance is still being heated. **(3)**

(c) Predict the temperature of the substance at 14 minutes if it continues to be heated at the same rate. **(2)**

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Mark scheme · 3.2 Chemistry: Materials: 1-hour Pack

Question 1

C (ink) **B1**

Answer: C) ink

Question 2

D (hydrogen) **B1**

Answer: D) hydrogen

Question 3

A (it can be poured and has a fixed volume) **B1**

Answer: A) it can be poured and has a fixed volume

Question 4

B (water) **B1**

Answer: B) water

Question 5

100 g (oe) **B1**

Answer: 100 g

Question 6

E (0.5 g/cm3) **B1**

Answer: E) 0.5 g/cm3

Question 7

C (bromine) **B1**

Answer: C) bromine

Question 8

B (its particles are packed in a regular pattern) **B1**

Answer: B) its particles are packed in a regular pattern

Question 9

D (copper) **B1**

Answer: D) copper

Question 10

Evaporation (crystallisation) (oe) **B1**

Answer: Evaporation (crystallisation)

Question 11

E (5 cm^3) **B1**

Answer: E) 5 cm^3

Question 12

A (crude oil) **B1**

Answer: A) crude oil

Question 13

E (its particles are far apart and move quickly in all directions) **B1**

Answer: E) its particles are far apart and move quickly in all directions

Question 14

C (sulfur) **B1**

Answer: C) sulfur

Question 15

Chromatography (oe) **B1**

Answer: Chromatography

Question 16

B (50 cm^3) **B1**

Answer: B) 50 cm^3

Question 17

A (air) **B1**

Answer: A) air

Question 18

A (tin) **B1**

Answer: A) tin

Question 19

E (it can be compressed easily) **B1**

Answer: E) it can be compressed easily

Question 20

67.5 g (oe) **B1**

Answer: 67.5 g

Question 21

B (75 cm^3) **B1**

Answer: B) 75 cm^3

Question 22

C (magnesium oxide) **B1**

Answer: C) magnesium oxide

Question 23

C (phosphorus) **B1**

Answer: C) phosphorus

Question 24

E (its particles are far apart and move quickly in all directions) **B1**

Answer: E) its particles are far apart and move quickly in all directions

Question 25

D (hydrogen) **B1**

Answer: D) hydrogen

Question 26

A (3 g/cm3) **B1**

Answer: A) 3 g/cm3

Question 27

B (carbon) **B1**

Answer: B) carbon

Question 28

E (chlorine) **B1**

Answer: E) chlorine

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Question 29

A (it has neither a fixed shape nor a fixed volume) **B1**

Answer: A) it has neither a fixed shape nor a fixed volume

Question 30

D (methane) **B1**

Answer: D) methane

Question 31

40 g (oe) **B1**

Answer: 40 g

Question 32

C (air) **B1**

Answer: C) air

Question 33

D (sodium) **B1**

Answer: D) sodium

Question 34

B (it can be poured and has a fixed volume) **B1**

Answer: B) it can be poured and has a fixed volume

Question 35

A (potassium) **B1**

Answer: A) potassium

Question 36

270 g (oe) **B1**

Answer: 270 g

Question 37

E (10.5 g/cm3) **B1**

Answer: E) 10.5 g/cm3

Question 38

C (crude oil) **B1**

Answer: C) crude oil

Question 39

C (calcium) **B1**

Answer: C) calcium

Question 40

B (it has a fixed shape) **B1**

Answer: B) it has a fixed shape

Question 41

D (hydrogen) **B1**

Answer: D) hydrogen

Question 42

Evaporation (crystallisation) (oe) **B1**

Answer: Evaporation (crystallisation)

Question 43

E (4 g/cm3) **B1**

Answer: E) 4 g/cm3

Question 44

A (hydrogen) **B1**

Answer: A) hydrogen

Question 45

D (gold) **B1**

Answer: D) gold

Question 46

B (sodium) **B1**

Answer: B) sodium

Question 47

Filtration (oe) **B1**

Answer: Filtration

Question 48

(a) 250 / 10 x 7, or equivalent method to find one part and scale up **M1**

(a) 175 g, cao **A1**

(a) Answer: 175 g

(b) 75 g, ft: 250 - their (a) **B1**

(b) Answer: 75 g

(c) zinc atoms are a different size from copper atoms, so they distort the regular layers of atoms in the copper, oe **B1**

(c) this disrupts the layers sliding over each other easily, making the alloy harder than the pure metal, oe **B1**

(c) Answer: The different-sized zinc atoms distort the regular layers of copper atoms, stopping the layers sliding over each other easily, so brass is harder than pure copper.

Question 49

C (27 g) **B1**

Answer: C) 27 g

Question 50

E (ammonia) **B1**

Answer: E) ammonia

Question 51

A (neon) **B1**

Answer: A) neon

Question 52

C (its particles are close together but can slide past one another) **B1**

Answer: C) its particles are close together but can slide past one another

Question 53

Evaporation (crystallisation) (oe) **B1**

Answer: Evaporation (crystallisation)

Question 54

E (75 g) **B1**

Answer: E) 75 g

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Question 55

(a) 0 (°C), cao **B1**

(a) Answer: 0C

(b) the energy supplied is being used to break/weaken the forces (bonds) holding the particles in their fixed positions, oe **B1**

(b) not to increase the kinetic energy/speed of the particles, so the temperature does not rise, oe **B1**

(b) once all the solid has melted into a liquid, the energy supplied increases the particles' kinetic energy again, so the temperature rises, oe **B1**

(b) Answer: The energy is used to break the forces between particles (melting) rather than to speed the particles up, so the temperature does not rise until melting is complete.

(c) identify the rate of temperature increase after melting is complete, e.g. +10C per 2 minutes from the pattern 10, 20, 30 **M1**

(c) 40 (°C), ft from their identified rate **A1**

(c) Answer: 40C

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