3.11 Chemistry: The Periodic Table and Separating Mixtures: 2-hour Pack

Total Marks

ISEB CE 13+ Science (Chemistry) · Calculator allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A mixture contains iron filings, salt and sand, all mixed together as dry solids. Describe, in detail, a sequence of steps that could be used to separate this mixture into three pure, dry substances: iron filings, sand and salt. In your answer, refer to the physical property of each substance that allows it to be separated at each stage.

(6)

2 What is the chemical symbol for fluorine?

- ☐ A) Sn
- ☐ B) B
- ☐ C) Br
- ☐ D) Zn
- ☐ E) F

3 In paper chromatography, a purple dye moves 1 cm from the start line while the solvent front moves 5 cm. Calculate the Rf value.

- ☐ A) 6
- ☐ B) 0.2
- ☐ C) 2
- ☐ D) 4
- ☐ E) 5

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4 What is the chemical symbol for calcium?

- [ ] A) Ca
- [ ] B) S
- [ ] C) Ag
- [ ] D) Hg
- [ ] E) Fe

---

5 What is the electron arrangement of silicon (atomic number 14)?

- [ ] A) 2,7
- [ ] B) 2,8,1
- [ ] C) 2,8,4
- [ ] D) 2,8,7
- [ ] E) 2,8,6

---

6 Which of these elements is NOT in the transition metals?

- [ ] A) cobalt
- [ ] B) titanium
- [ ] C) manganese
- [ ] D) lithium
- [ ] E) iron

---

7 What is the chemical symbol for sodium?

- [ ] A) Al
- [ ] B) Li
- [ ] C) Na
- [ ] D) Fe
- [ ] E) Zn

---

8 Which of these elements is NOT in Group 2?

- [ ] A) calcium
- [ ] B) barium
- [ ] C) strontium
- [ ] D) xenon
- [ ] E) magnesium

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9 What is the chemical symbol for argon?

- [ ] A) Ar
- [ ] B) Be
- [ ] C) P
- [ ] D) Fe
- [ ] E) Ca

---

10 An atom of hydrogen has atomic number 1 and mass number 1. How many neutrons does it have?

- [ ] A) 3
- [ ] B) 0
- [ ] C) 2
- [ ] D) 4
- [ ] E) 1

---

11 Which of these elements is NOT in Group 7 (halogens)?

- [ ] A) fluorine
- [ ] B) bromine
- [ ] C) chlorine
- [ ] D) iodine
- [ ] E) lithium

---

12 What is the chemical symbol for sulfur?

- [ ] A) Ar
- [ ] B) S
- [ ] C) Cl
- [ ] D) N
- [ ] E) Cu

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13 What is the electron arrangement of lithium (atomic number 3)?

- [ ] A) 2,8
- [ ] B) 2
- [ ] C) 2,1
- [ ] D) 2,8,4
- [ ] E) 2,8,7

---

14 Which of these elements is NOT in Group 7 (halogens)?

- [ ] A) iodine
- [ ] B) chlorine
- [ ] C) fluorine
- [ ] D) potassium
- [ ] E) bromine

---

15 What is the chemical symbol for iodine?

- [ ] A) I
- [ ] B) Ar
- [ ] C) Ag
- [ ] D) P
- [ ] E) Be

---

16 What is the electron arrangement of phosphorus (atomic number 15)?

- [ ] A) 1
- [ ] B) 2,8,5
- [ ] C) 2,4
- [ ] D) 2,1
- [ ] E) 2,8,8,1

---

17 Which of these elements is NOT in Group 1 (alkali metals)?

- [ ] A) chlorine
- [ ] B) potassium
- [ ] C) lithium
- [ ] D) sodium
- [ ] E) caesium

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18 What is the chemical symbol for silver?

- [ ] A) Sn
- [ ] B) Na
- [ ] C) S
- [ ] D) Ag
- [ ] E) Al

---

19 An atom of phosphorus has atomic number 15 and mass number 31. How many neutrons does it have?

- [ ] A) 15
- [ ] B) 14
- [ ] C) 18
- [ ] D) 31
- [ ] E) 16

---

20 Which of these elements is NOT in the transition metals?

- [ ] A) manganese
- [ ] B) nickel
- [ ] C) magnesium
- [ ] D) titanium
- [ ] E) iron

---

21 What is the chemical symbol for carbon?

- [ ] A) Ne
- [ ] B) Li
- [ ] C) Ni
- [ ] D) K
- [ ] E) C

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22 What is the electron arrangement of argon (atomic number 18)?

- [ ] A) 1
- [ ] B) 2,8,2
- [ ] C) 2,8,8
- [ ] D) 2,2
- [ ] E) 2,4

---

23 In which part of the periodic table is copper found?

- [ ] A) the transition metals
- [ ] B) Group 7 (halogens)
- [ ] C) Group 0 (noble gases)
- [ ] D) Group 2
- [ ] E) Group 1 (alkali metals)

---

24 What is the chemical symbol for magnesium?

- [ ] A) Ne
- [ ] B) Mg
- [ ] C) Ni
- [ ] D) Si
- [ ] E) B

---

25 An atom of boron has atomic number 5 and mass number 11. How many neutrons does it have?

- [ ] A) 5
- [ ] B) 9
- [ ] C) 3
- [ ] D) 6
- [ ] E) 11

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26 Which of these elements is NOT in the transition metals?

- [ ] A) manganese
- [ ] B) chromium
- [ ] C) fluorine
- [ ] D) iron
- [ ] E) cobalt

---

27 What is the chemical symbol for gold?

- [ ] A) Au
- [ ] B) Na
- [ ] C) He
- [ ] D) Ag
- [ ] E) Cl

---

28 What is the electron arrangement of aluminium (atomic number 13)?

- [ ] A) 2,8,5
- [ ] B) 2,7
- [ ] C) 2,5
- [ ] D) 2,8,3
- [ ] E) 2,6

---

29 Which of these elements is NOT in Group 1 (alkali metals)?

- [ ] A) potassium
- [ ] B) iodine
- [ ] C) sodium
- [ ] D) caesium
- [ ] E) lithium

---

30 What is the chemical symbol for nickel?

- [ ] A) Fe
- [ ] B) Si
- [ ] C) Ar
- [ ] D) N
- [ ] E) Ni

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31 Rock salt is a mixture of salt and sand. Arjun wants to obtain a sample of pure, dry sand from a sample of rock salt. Arjun first dissolves the mixture in water to separate the sand from the salt. Name the process he should use next to remove the undissolved sand from the mixture.

.....

(1)

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32 An atom of neon has atomic number 10 and mass number 20. How many neutrons does it have?

- ☐ A) 11
- ☐ B) 10
- ☐ C) 14
- ☐ D) 13
- ☐ E) 20

---

33 Which of these elements is NOT in Group 7 (halogens)?

- ☐ A) xenon
- ☐ B) iodine
- ☐ C) fluorine
- ☐ D) chlorine
- ☐ E) bromine

---

34 What is the chemical symbol for neon?

- ☐ A) F
- ☐ B) Fe
- ☐ C) Hg
- ☐ D) S
- ☐ E) Ne

---

35 What is the electron arrangement of carbon (atomic number 6)?

- ☐ A) 2
- ☐ B) 2,8,3
- ☐ C) 2,8,8,2
- ☐ D) 2,4
- ☐ E) 2,6

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36 What is the chemical symbol for boron?

- [ ] A) Ni
- [ ] B) Ag
- [ ] C) Cl
- [ ] D) Na
- [ ] E) B

---

37 What is the electron arrangement of nitrogen (atomic number 7)?

- [ ] A) 2,5
- [ ] B) 2,8,4
- [ ] C) 2,8,8
- [ ] D) 2,8,3
- [ ] E) 2,6

---

38 Which of these elements is NOT in Group 0 (noble gases)?

- [ ] A) helium
- [ ] B) iodine
- [ ] C) neon
- [ ] D) argon
- [ ] E) krypton

---

39 What is the chemical symbol for tin?

- [ ] A) O
- [ ] B) Mg
- [ ] C) F
- [ ] D) Sn
- [ ] E) Be

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40 An atom of silicon has atomic number 14 and mass number 28. How many neutrons does it have?

- [ ] A) 16
- [ ] B) 28
- [ ] C) 14
- [ ] D) 18
- [ ] E) 12

---

41 In paper chromatography, a green dye moves 6 cm from the start line while the solvent front moves 10 cm. Calculate the Rf value.

- [ ] A) 6
- [ ] B) 0.6
- [ ] C) 4
- [ ] D) 16
- [ ] E) 60

---

42 Which of these elements is NOT in the transition metals?

- [ ] A) cobalt
- [ ] B) chromium
- [ ] C) argon
- [ ] D) titanium
- [ ] E) manganese

---

43 Which element has the chemical symbol Ca?

- [ ] A) bromine
- [ ] B) sulfur
- [ ] C) gold
- [ ] D) sodium
- [ ] E) calcium

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44 What is the electron arrangement of helium (atomic number 2)?

- [ ] A) 2,1
- [ ] B) 2,8,3
- [ ] C) 2,6
- [ ] D) 2
- [ ] E) 2,8,8

---

45 In which part of the periodic table is manganese found?

- [ ] A) the transition metals
- [ ] B) Group 7 (halogens)
- [ ] C) Group 1 (alkali metals)
- [ ] D) Group 0 (noble gases)
- [ ] E) Group 2

---

46 Which element has the chemical symbol Sn?

- [ ] A) carbon
- [ ] B) tin
- [ ] C) mercury
- [ ] D) bromine
- [ ] E) nitrogen

---

47 An atom of magnesium has atomic number 12 and mass number 24. How many neutrons does it have?

- [ ] A) 15
- [ ] B) 11
- [ ] C) 16
- [ ] D) 10
- [ ] E) 12

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48 Which of these elements is NOT in the transition metals?

- [ ] A) nickel
- [ ] B) strontium
- [ ] C) chromium
- [ ] D) copper
- [ ] E) titanium

---

49 Which element has the chemical symbol Au?

- [ ] A) gold
- [ ] B) mercury
- [ ] C) phosphorus
- [ ] D) iodine
- [ ] E) tin

---

50 What is the electron arrangement of hydrogen (atomic number 1)?

- [ ] A) 2
- [ ] B) 2,6
- [ ] C) 1
- [ ] D) 2,8,8,2
- [ ] E) 2,2

---

51 Which of these elements is in Group 1 (alkali metals)?

- [ ] A) nickel
- [ ] B) magnesium
- [ ] C) fluorine
- [ ] D) iodine
- [ ] E) rubidium

---

52 Which method is best for separating iron filings from sulfur powder?

- [ ] A) chromatography
- [ ] B) distillation
- [ ] C) filtration
- [ ] D) using a magnet
- [ ] E) evaporation

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53 Which element has the chemical symbol K?

- ☐ A) lithium
- ☐ B) potassium
- ☐ C) fluorine
- ☐ D) copper
- ☐ E) argon

---

54 A pupil investigates how the depth of water affects the evaporation rate. She sets up four identical dishes with different depths of water: 1 cm, 2 cm, 3 cm and 4 cm. She measures the mass of water lost from each dish after 48 hours at constant temperature. State the independent variable in this investigation.

(1)

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55 In paper chromatography, a blue dye moves 5.6 cm from the start line while the solvent front moves 8 cm. Calculate the Rf value.

- ☐ A) 0.7
- ☐ B) 2.4
- ☐ C) 7
- ☐ D) 13.6
- ☐ E) 44.8

---

56 An element has the electron arrangement 2,2. In which group of the periodic table is it?

- ☐ A) Group 0
- ☐ B) Group 3
- ☐ C) Group 1
- ☐ D) Group 2
- ☐ E) Group 7

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57 In which part of the periodic table is krypton found?

- ☐ A) Group 0 (noble gases)
- ☐ B) Group 1 (alkali metals)
- ☐ C) Group 7 (halogens)
- ☐ D) Group 2
- ☐ E) the transition metals

---

58 Which of these jobs is best done by evaporation?

- ☐ A) obtaining pure water from salt water
- ☐ B) separating the dyes in black ink
- ☐ C) obtaining dry salt from salt solution
- ☐ D) removing steel pins from a pile of sand
- ☐ E) removing tea leaves from a cup of tea

---

59 What is the chemical symbol for mercury?

- ☐ A) S
- ☐ B) Cu
- ☐ C) Ni
- ☐ D) Li
- ☐ E) Hg

---

60 A pupil investigates how the surface area of a water sample affects the rate of evaporation. She sets up four identical containers with different water surface areas and measures the volume of water lost from each after 24 hours at constant temperature. State the independent variable in this investigation.

(1)

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61 A red dye has an Rf value of 0.6 in a solvent. The solvent front moves 4 cm. How far does the dye move from the start line, in cm?

- [ ] A) 2.4 cm
- [ ] B) 24 cm
- [ ] C) 4.6 cm
- [ ] D) 0.15 cm
- [ ] E) 3.4 cm

---

62 What is the electron arrangement of oxygen (atomic number 8)?

- [ ] A) 2,8,1
- [ ] B) 2,2
- [ ] C) 2,6
- [ ] D) 2,7
- [ ] E) 2,1

---

63 In which part of the periodic table is xenon found?

- [ ] A) Group 1 (alkali metals)
- [ ] B) Group 0 (noble gases)
- [ ] C) Group 2
- [ ] D) the transition metals
- [ ] E) Group 7 (halogens)

---

64 Which of these jobs is best done by filtration?

- [ ] A) finding which food colourings are in a sweet's coating
- [ ] B) separating the dyes in black ink
- [ ] C) obtaining pure water from salt water
- [ ] D) removing steel pins from a pile of sand
- [ ] E) removing insoluble chalk powder from water

---

65 Flour is a mixture of grain and insoluble husks. Elena wants to obtain pure, dissolved starch from a sample of this mixture. She first dissolves the mixture in water. Name the process she should use next to remove the insoluble husks from the mixture.

.....

(1)

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66 A red dye has an Rf value of 0.8 in a solvent. The solvent front moves 5 cm. How far does the dye move from the start line, in cm?

- [ ] A) 0.16 cm
- [ ] B) 6.25 cm
- [ ] C) 4.2 cm
- [ ] D) 4 cm
- [ ] E) 5.8 cm

---

67 An atom of aluminium has atomic number 13 and mass number 27. How many neutrons does it have?

- [ ] A) 11
- [ ] B) 14
- [ ] C) 13
- [ ] D) 27
- [ ] E) 12

---

68 In which part of the periodic table is bromine found?

- [ ] A) the transition metals
- [ ] B) Group 1 (alkali metals)
- [ ] C) Group 2
- [ ] D) Group 0 (noble gases)
- [ ] E) Group 7 (halogens)

---

69 Which of these jobs is best done by filtration?

- [ ] A) separating coffee grounds from coffee
- [ ] B) finding which food colourings are in a sweet's coating
- [ ] C) obtaining dry salt from salt solution
- [ ] D) separating the dyes in black ink
- [ ] E) removing steel pins from a pile of sand

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70 What is the chemical symbol for iron?

- [ ] A) Si
- [ ] B) Be
- [ ] C) Fe
- [ ] D) H
- [ ] E) B

---

71 Table salt is a mixture of salt and insoluble sand. Nina wants to obtain pure, dry salt from the mixture. After dissolving in water and filtering, she has a clear salt solution. Name the process she should use next to obtain dry salt crystals.

(1)

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72 A red dye has an Rf value of 0.7 in a solvent. The solvent front moves 12 cm. How far does the dye move from the start line, in cm?

- [ ] A) 12.7 cm
- [ ] B) 84 cm
- [ ] C) 0.84 cm
- [ ] D) 11.3 cm
- [ ] E) 8.4 cm

---

73 An element has the electron arrangement 2,3. In which group of the periodic table is it?

- [ ] A) Group 4
- [ ] B) Group 2
- [ ] C) Group 6
- [ ] D) Group 3
- [ ] E) Group 0

---

74 Which of these elements is in Group 2?

- [ ] A) xenon
- [ ] B) calcium
- [ ] C) neon
- [ ] D) nickel
- [ ] E) sodium

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75 Which method is best for obtaining dry salt from salt solution?

- [ ] A) evaporation
- [ ] B) using a magnet
- [ ] C) filtration
- [ ] D) chromatography
- [ ] E) distillation

---

76 Which element has the chemical symbol Si?

- [ ] A) boron
- [ ] B) copper
- [ ] C) silicon
- [ ] D) nickel
- [ ] E) sodium

---

77 A suspension of fine clay particles in water needs to be separated. Maya wants to obtain pure water and separated clay. Name the first process Maya should use to remove the clay particles from the water.

(1)

---

78 A green dye has an Rf value of 0.3 in a solvent. The solvent front moves 4 cm. How far does the dye move from the start line, in cm?

- [ ] A) 3.7 cm
- [ ] B) 12 cm
- [ ] C) 0.075 cm
- [ ] D) 1.2 cm
- [ ] E) 4.3 cm

---

79 An element has the electron arrangement 2,8,5. In which group of the periodic table is it?

- [ ] A) Group 0
- [ ] B) Group 1
- [ ] C) Group 4
- [ ] D) Group 6
- [ ] E) Group 5

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80 In which part of the periodic table is caesium found?

- ☐ A) Group 7 (halogens)
- ☐ B) Group 1 (alkali metals)
- ☐ C) Group 2
- ☐ D) Group 0 (noble gases)
- ☐ E) the transition metals

---

81 Which of these jobs is best done by chromatography?

- ☐ A) obtaining pure water from salt water
- ☐ B) removing steel pins from a pile of sand
- ☐ C) finding which food colourings are in a sweet's coating
- ☐ D) separating iron filings from sulfur powder
- ☐ E) obtaining dry salt from salt solution

---

82 What is the chemical symbol for zinc?

- ☐ A) Zn
- ☐ B) Br
- ☐ C) Fe
- ☐ D) S
- ☐ E) I

---

83 Copper sulfate is a mixture of copper sulfate crystals and insoluble copper oxide. Tom wants to obtain a sample of pure, dry copper sulfate from the mixture. Tom first dissolves the copper sulfate in water and filters out the solid. Name the process Tom should use next to obtain dry copper sulfate crystals from the remaining salt solution.

(1)

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84 In paper chromatography, a yellow dye moves 1 cm from the start line while the solvent front moves 4 cm. Calculate the Rf value.

- [ ] A) 2.5
- [ ] B) 5
- [ ] C) 4
- [ ] D) 0.25
- [ ] E) 3

---

85 An atom of argon has atomic number 18 and mass number 40. How many neutrons does it have?

- [ ] A) 19
- [ ] B) 22
- [ ] C) 40
- [ ] D) 25
- [ ] E) 18

---

86 In which part of the periodic table is lithium found?

- [ ] A) Group 2
- [ ] B) Group 7 (halogens)
- [ ] C) Group 0 (noble gases)
- [ ] D) the transition metals
- [ ] E) Group 1 (alkali metals)

---

87 Which method is best for separating the dyes in black ink?

- [ ] A) chromatography
- [ ] B) using a magnet
- [ ] C) distillation
- [ ] D) filtration
- [ ] E) evaporation

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88 Which element has the chemical symbol Pb?

- [ ] A) copper
- [ ] B) sodium
- [ ] C) lead
- [ ] D) potassium
- [ ] E) lithium

---

89 Yasmin wants to separate a suspension of fine particles in water using filtration. Name the piece of porous material used to trap the solid particles during filtration.

.....

.....

(1)

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90 In paper chromatography, a red dye moves 15 cm from the start line while the solvent front moves 20 cm. Calculate the Rf value.

- [ ] A) 300
- [ ] B) 0.75
- [ ] C) 5
- [ ] D) 7.5
- [ ] E) 35

---

91 An element has the electron arrangement 2,8,8,2. In which group of the periodic table is it?

- [ ] A) Group 2
- [ ] B) Group 4
- [ ] C) Group 3
- [ ] D) Group 7
- [ ] E) Group 1

---

92 In which part of the periodic table is neon found?

- [ ] A) Group 1 (alkali metals)
- [ ] B) Group 2
- [ ] C) the transition metals
- [ ] D) Group 0 (noble gases)
- [ ] E) Group 7 (halogens)

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93 Which element has the chemical symbol N?

- ☐ A) gold
- ☐ B) aluminium
- ☐ C) nitrogen
- ☐ D) tin
- ☐ E) phosphorus

---

94 Potassium iodide is a mixture of potassium iodide crystals and insoluble silica. Rosa wants to obtain dry potassium iodide crystals from the mixture. Rosa first dissolves the compound in water and filters out the silica. Name the process Rosa should use next to obtain dry potassium iodide crystals from the solution.

(1)

---

95 Chidi wants to separate a mixture of sand and water using filtration.

(a) Name the piece of apparatus used to hold the filter paper during filtration. **(1)**

(b) Describe how filtration separates the sand from the water. **(2)**

(c) State the name given to the sand that remains on the filter paper, and the name given to the liquid that passes through. **(2)**

---

96 In paper chromatography, a purple dye moves 3.2 cm from the start line while the solvent front moves 4 cm. Calculate the Rf value.

- ☐ A) 7.2
- ☐ B) 12.8
- ☐ C) 0.8
- ☐ D) 1.25
- ☐ E) 8

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97 An element has the electron arrangement 2,4. In which group of the periodic table is it?

- ☐ A) Group 4
- ☐ B) Group 0
- ☐ C) Group 5
- ☐ D) Group 7
- ☐ E) Group 2

---

98 In which part of the periodic table is beryllium found?

- ☐ A) Group 7 (halogens)
- ☐ B) Group 2
- ☐ C) Group 1 (alkali metals)
- ☐ D) Group 0 (noble gases)
- ☐ E) the transition metals

---

99 Which of these jobs is best done by filtration?

- ☐ A) obtaining pure water from salt water
- ☐ B) obtaining dry salt from salt solution
- ☐ C) separating the dyes in black ink
- ☐ D) removing tea leaves from a cup of tea
- ☐ E) removing steel pins from a pile of sand

---

100 What is the chemical symbol for bromine?

- ☐ A) Zn
- ☐ B) S
- ☐ C) I
- ☐ D) O
- ☐ E) Br

---

101 A mixture of food additives is separated using paper chromatography. A single substance in the mixture travels 4.5 cm from the baseline while the solvent front travels 10.0 cm. Calculate the Rf value of this substance.

(1)

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102 A blue dye has an Rf value of 0.8 in a solvent. The solvent front moves 20 cm. How far does the dye move from the start line, in cm?

- [ ] A) 0.04 cm
- [ ] B) 19.2 cm
- [ ] C) 16 cm
- [ ] D) 25 cm
- [ ] E) 20.8 cm

---

103 An atom of sodium has atomic number 11 and mass number 23. How many neutrons does it have?

- [ ] A) 11
- [ ] B) 12
- [ ] C) 10
- [ ] D) 16
- [ ] E) 23

---

104 Which of these elements is NOT in the transition metals?

- [ ] A) titanium
- [ ] B) cobalt
- [ ] C) iron
- [ ] D) copper
- [ ] E) helium

---

105 Which method is best for finding which food colourings are in a sweet's coating?

- [ ] A) chromatography
- [ ] B) using a magnet
- [ ] C) evaporation
- [ ] D) filtration
- [ ] E) distillation

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106 Amara has a solution of salt dissolved in water and wants to obtain dry salt crystals from it.

(a) Describe how Amara could use evaporation to obtain dry salt crystals from the solution. **(2)**

(b) Explain why Amara should not heat the solution very strongly right until the very end of the process. **(2)**

---

107 Which element has the chemical symbol S?

- ☐ A) mercury
- ☐ B) sodium
- ☐ C) chlorine
- ☐ D) sulfur
- ☐ E) bromine

---

108 A purple dye has an Rf value of 0.5 in a solvent. The solvent front moves 12 cm. How far does the dye move from the start line, in cm?

- ☐ A) 60 cm
- ☐ B) 11.5 cm
- ☐ C) 12.5 cm
- ☐ D) 24 cm
- ☐ E) 6 cm

---

109 An element has the electron arrangement 2,8,1. In which group of the periodic table is it?

- ☐ A) Group 2
- ☐ B) Group 1
- ☐ C) Group 0
- ☐ D) Group 5
- ☐ E) Group 6

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110 Which of these elements is in Group 7 (halogens)?

- [ ] A) caesium
- [ ] B) beryllium
- [ ] C) chlorine
- [ ] D) iron
- [ ] E) manganese

---

111 Which method is best for removing tea leaves from a cup of tea?

- [ ] A) filtration
- [ ] B) chromatography
- [ ] C) evaporation
- [ ] D) distillation
- [ ] E) using a magnet

---

112 Which element has the chemical symbol Fe?

- [ ] A) nitrogen
- [ ] B) lithium
- [ ] C) bromine
- [ ] D) iron
- [ ] E) silver

---

113 A mixture contains salt, sand and water. Ethan wants to separate the components. He first uses filtration to remove the sand. Name the next process Ethan should use to separate salt from the remaining salt solution.

(1)

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114 A blue dye has an Rf value of 0.5 in a solvent. The solvent front moves 15 cm. How far does the dye move from the start line, in cm?

- [ ] A) 15.5 cm
- [ ] B) 14.5 cm
- [ ] C) 75 cm
- [ ] D) 30 cm
- [ ] E) 7.5 cm

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115 An element has the electron arrangement 2,8,3. In which group of the periodic table is it?

- [ ] A) Group 3
- [ ] B) Group 6
- [ ] C) Group 2
- [ ] D) Group 7
- [ ] E) Group 5

---

116 In which part of the periodic table is titanium found?

- [ ] A) Group 7 (halogens)
- [ ] B) Group 2
- [ ] C) the transition metals
- [ ] D) Group 1 (alkali metals)
- [ ] E) Group 0 (noble gases)

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Mark scheme · 3.11 Chemistry: The Periodic Table and Separating Mixtures: 2-hour Pack

Question 1

Level 1 Basic, isolated statement(s) naming one or two separation techniques, with little or no reference to the properties that make them work, and/or an incomplete or muddled sequence. **1-2**

Level 2 Most of the separation techniques needed (magnetic separation, dissolving and filtration, evaporation) are identified in a broadly sensible order, with some reference to the relevant properties of the substances, though the explanation may be incomplete in places. **3-4**

Level 3 A complete, logically ordered sequence of steps that separates all three substances as pure, dry solids, with each step clearly linked to the specific physical property (magnetism, solubility, and the fact that water can be evaporated away) that makes it work, using accurate scientific vocabulary throughout. **5-6**

Indicative content:

- Iron filings are magnetic, so a magnet is passed through/over the dry mixture first to attract and remove the iron filings, leaving salt and sand mixed together.
- The remaining salt and sand mixture is added to water and stirred; the salt dissolves (is soluble) but the sand does not (is insoluble).
- The mixture is then filtered: the insoluble sand is left behind on the filter paper as the residue, while the salt solution passes through as the filtrate.
- The sand residue is washed and left to dry (e.g. in a warm place or oven) to give pure, dry sand.
- The filtrate (salt solution) is then heated/evaporated (e.g. in an evaporating basin) so the water evaporates off, leaving pure, dry salt crystals behind.
- Overall order: magnetic separation removes the iron filings first; dissolving and filtration then separate the sand from the salt (in solution); evaporation of the filtrate finally gives the salt.

Question 2

E (F) **B1**

Answer: E) F

Question 3

B (0.2) **B1**

Answer: B) 0.2

Question 4

A (Ca) **B1**

Answer: A) Ca

Question 5

C (2,8,4) **B1**

Answer: C) 2,8,4

Question 6

D (lithium) **B1**

Answer: D) lithium

Question 7

C (Na) **B1**

Answer: C) Na

Question 8

D (xenon) **B1**

Answer: D) xenon

Question 9

A (Ar) **B1**

Answer: A) Ar

Question 10

B (0) **B1**

Answer: B) 0

Question 11

E (lithium) **B1**

Answer: E) lithium

Question 12

B (S) **B1**

Answer: B) S

Question 13

C (2,1) **B1**

Answer: C) 2,1

Question 14

D (potassium) **B1**

Answer: D) potassium

Question 15

A (I) **B1**

Answer: A) I

Question 16

B (2,8,5) **B1**

Answer: B) 2,8,5

Question 17

A (chlorine) **B1**

Answer: A) chlorine

Question 18

D (Ag) **B1**

Answer: D) Ag

Question 19

E (16) **B1**

Answer: E) 16

Question 20

C (magnesium) **B1**

Answer: C) magnesium

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Question 21

E (C) **B1**

Answer: E) C

Question 22

C (2,8,8) **B1**

Answer: C) 2,8,8

Question 23

A (the transition metals) **B1**

Answer: A) the transition metals

Question 24

B (Mg) **B1**

Answer: B) Mg

Question 25

D (6) **B1**

Answer: D) 6

Question 26

C (fluorine) **B1**

Answer: C) fluorine

Question 27

A (Au) **B1**

Answer: A) Au

Question 28

D (2,8,3) **B1**

Answer: D) 2,8,3

Question 29

B (iodine) **B1**

Answer: B) iodine

Question 30

E (Ni) **B1**

Answer: E) Ni

Question 31

Filtration (oe) **B1**

Answer: Filtration

Question 32

B (10) **B1**

Answer: B) 10

Question 33

A (xenon) **B1**

Answer: A) xenon

Question 34

E (Ne) **B1**

Answer: E) Ne

Question 35

D (2,4) **B1**

Answer: D) 2,4

Question 36

E (B) **B1**

Answer: E) B

Question 37

A (2,5) **B1**

Answer: A) 2,5

Question 38

B (iodine) **B1**

Answer: B) iodine

Question 39

D (Sn) **B1**

Answer: D) Sn

Question 40

C (14) **B1**

Answer: C) 14

Question 41

B (0.6) **B1**

Answer: B) 0.6

Question 42

C (argon) **B1**

Answer: C) argon

Question 43

E (calcium) **B1**

Answer: E) calcium

Question 44

D (2) **B1**

Answer: D) 2

Question 45

A (the transition metals) **B1**

Answer: A) the transition metals

Question 46

B (tin) **B1**

Answer: B) tin

Question 47

E (12) **B1**

Answer: E) 12

Question 48

B (strontium) **B1**

Answer: B) strontium

Question 49

A (gold) **B1**

Answer: A) gold

Question 50

C (1) **B1**

Answer: C) 1

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Question 51

E (rubidium) **B1**

Answer: E) rubidium

Question 52

D (using a magnet) **B1**

Answer: D) using a magnet

Question 53

B (potassium) **B1**

Answer: B) potassium

Question 54

Depth of water (oe) **B1**

Answer: Depth of water

Question 55

A (0.7) **B1**

Answer: A) 0.7

Question 56

D (Group 2) **B1**

Answer: D) Group 2

Question 57

A (Group 0 (noble gases)) **B1**

Answer: A) Group 0 (noble gases)

Question 58

C (obtaining dry salt from salt solution) **B1**

Answer: C) obtaining dry salt from salt solution

Question 59

E (Hg) **B1**

Answer: E) Hg

Question 60

Surface area (oe) **B1**

Answer: Surface area

Question 61

A (2.4 cm) **B1**

Answer: A) 2.4 cm

Question 62

C (2,6) **B1**

Answer: C) 2,6

Question 63

B (Group 0 (noble gases)) **B1**

Answer: B) Group 0 (noble gases)

Question 64

E (removing insoluble chalk powder from water) **B1**

Answer: E) removing insoluble chalk powder from water

Question 65

Filtration (oe) **B1**

Answer: Filtration

Question 66

D (4 cm) **B1**

Answer: D) 4 cm

Question 67

B (14) **B1**

Answer: B) 14

Question 68

E (Group 7 (halogens)) **B1**

Answer: E) Group 7 (halogens)

Question 69

A (separating coffee grounds from coffee) **B1**

Answer: A) separating coffee grounds from coffee

Question 70

C (Fe) **B1**

Answer: C) Fe

Question 71

Evaporation (oe) **B1**

Answer: Evaporation

Question 72

E (8.4 cm) **B1**

Answer: E) 8.4 cm

Question 73

D (Group 3) **B1**

Answer: D) Group 3

Question 74

B (calcium) **B1**

Answer: B) calcium

Question 75

A (evaporation) **B1**

Answer: A) evaporation

Question 76

C (silicon) **B1**

Answer: C) silicon

Question 77

Filtration (oe) **B1**

Answer: Filtration

Question 78

D (1.2 cm) **B1**

Answer: D) 1.2 cm

Question 79

E (Group 5) **B1**

Answer: E) Group 5

Question 80

B (Group 1 (alkali metals)) **B1**

Answer: B) Group 1 (alkali metals)

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Question 81

C (finding which food colourings are in a sweet's coating) **B1**

Answer: C) finding which food colourings are in a sweet's coating

Question 82

A (Zn) **B1**

Answer: A) Zn

Question 83

Evaporation (oe) **B1**

Answer: Evaporation

Question 84

D (0.25) **B1**

Answer: D) 0.25

Question 85

B (22) **B1**

Answer: B) 22

Question 86

E (Group 1 (alkali metals)) **B1**

Answer: E) Group 1 (alkali metals)

Question 87

A (chromatography) **B1**

Answer: A) chromatography

Question 88

C (lead) **B1**

Answer: C) lead

Question 89

Filter paper (oe) **B1**

Answer: Filter paper

Question 90

B (0.75) **B1**

Answer: B) 0.75

Question 91

A (Group 2) **B1**

Answer: A) Group 2

Question 92

D (Group 0 (noble gases)) **B1**

Answer: D) Group 0 (noble gases)

Question 93

C (nitrogen) **B1**

Answer: C) nitrogen

Question 94

Evaporation (oe) **B1**

Answer: Evaporation

Question 95

(a) filter funnel, cao **B1**

(a) Answer: Filter funnel

(b) the filter paper has very small holes/pores that let the water particles pass through, oe **B1**

(b) but the (insoluble) sand particles are too large to pass through, so they are trapped/left behind on the paper, oe **B1**

(b) Answer: The filter paper's tiny pores let water pass through but are too small for the insoluble sand particles, which are trapped on the paper.

(c) residue (for the sand), cao **B1**

(c) filtrate (for the liquid), cao **B1**

(c) Answer: Sand = residue; water = filtrate.

Question 96

C (0.8) **B1**

Answer: C) 0.8

Question 97

A (Group 4) **B1**

Answer: A) Group 4

Question 98

B (Group 2) **B1**

Answer: B) Group 2

Question 99

D (removing tea leaves from a cup of tea) **B1**

Answer: D) removing tea leaves from a cup of tea

Question 100

E (Br) **B1**

Answer: E) Br

Question 101

0.45 (oe) **B1**

Answer: 0.45

Question 102

C (16 cm) **B1**

Answer: C) 16 cm

Question 103

B (12) **B1**

Answer: B) 12

Question 104

E (helium) **B1**

Answer: E) helium

Question 105

A (chromatography) **B1**

Answer: A) chromatography

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Question 106

(a) heat the solution gently, e.g. in an evaporating basin over a Bunsen burner, oe **B1**

(a) so the water (solvent) evaporates away, leaving the dissolved salt behind as dry solid crystals, oe **B1**

(a) Answer: Heat the solution gently (e.g. in an evaporating basin) so the water evaporates away, leaving dry salt crystals behind.

(b) heating too strongly/quickly near the end can cause the salt to spit/spurt out of the container (or decompose), oe **B1**

(b) so heating should be slowed/stopped once most of the water has gone, leaving a hot saturated solution to cool and crystallise (or to evaporate the rest more gently), oe **B1**

(b) Answer: Strong heating near the end can make the salt spit out of the container, so heating should be slowed once a hot saturated solution remains, allowing it to cool and crystallise gently.

Question 107

D (sulfur) **B1**

Answer: D) sulfur

Question 108

E (6 cm) **B1**

Answer: E) 6 cm

Question 109

B (Group 1) **B1**

Answer: B) Group 1

Question 110

C (chlorine) **B1**

Answer: C) chlorine

Question 111

A (filtration) **B1**

Answer: A) filtration

Question 112

D (iron) **B1**

Answer: D) iron

Question 113

Evaporation (oe) **B1**

Answer: Evaporation

Question 114

E (7.5 cm) **B1**

Answer: E) 7.5 cm

Question 115

A (Group 3) **B1**

Answer: A) Group 3

Question 116

C (the transition metals) **B1**

Answer: C) the transition metals

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