

## 7. Ionic Bond

1. The element with atomic number 9 will form ionic bonds readily with an element whose atomic number is
- A 7.
  - B 12.
  - C 15.
  - D 17.

2. Consider the following atoms:

Atom	W	X	Y	Z
Atomic number	3	10	14	15

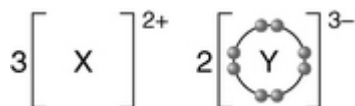
Which atom is likely to lose electron(s) during reactions?

- A W
  - B X
  - C Y
  - D Z
3. An element with an atomic number 20 will combine most readily with an element whose atomic number is
- A 3.
  - B 11.
  - C 17.
  - D 18.
4. Four elements W, X, Y, Z have atomic numbers  $x-1$ ,  $x$ ,  $x+1$  and  $x+2$  respectively. It is known that  $x = 9$ . Which of the following pairs of elements will form an ionic compound upon combination?
- A W and X
  - B X and Y
  - C X and Z
  - D Y and Z
5. In which of the following compounds do both ions have the same electronic arrangement as an argon atom?
- A Calcium sulphide
  - B Magnesium iodide
  - C Potassium fluoride
  - D Sodium chloride
6. Which of the following pairs of elements in Groups I and VII of the periodic table would react with each other most vigorously?
- |   | <u>Group I</u> | <u>Group VII</u> |
|---|----------------|------------------|
| A | Sodium         | chlorine         |
| B | Sodium         | fluorine         |
| C | Potassium      | fluorine         |
| D | Potassium      | chlorine         |

7. Which of the following is an electron diagram of calcium iodide (showing electrons in the *outermost shells* only)?



8. Elements X and Y form a compound with the following electronic structure:



(Only electrons in the *outermost shells* are shown.) Which of the following combinations is correct?

	<u>X</u>	<u>Y</u>
A	Be	O
B	Al	S
C	Mg	N
D	C	O

9. Elements X and Y belong to the first three periods of the periodic table. The compound formed between these two elements has the following electronic structure:



(Only electrons in the *outermost shells* are shown.)

How many electrons are there in the outermost shell of an atom of X and that of Y?

	<u>X</u>	<u>Y</u>
A	1	8
B	1	5
C	2	5
D	2	8

10. Consider the information given in the table below:

Element	Atomic number
w	6
x	10
y	12
z	17

Which of the following pairs of elements would react with each other most readily?

- A w and x
- B w and y
- C x and z
- D y and z

11. Which of the following substances is / are electrolyte(s)?

- (1) Copper
- (2) Potassium chloride
- (3) Molten sulphur

- A (1) only
- B (2) only
- C (1) and (3) only
- D (2) and (3) only

12. Strontium is below calcium in Group II of the periodic table. Which of the following statements concerning strontium is / are correct?

- (1) It combines with chlorine to form an ionic compound.
- (2) It is in Period 4 of the periodic table.
- (3) It forms an ion carrying two negative charges.

- A (1) only
- B (2) only
- C (1) and (3) only
- D (2) and (3) only

13. Consider the following information about three elements X, Y and Z.

Element	X	Y	Z
Atomic number	8	11	16

Which of the following statements concerning X, Y and Z are correct?

- (1) X and Y react to form an ionic compound.
- (2) Y and Z belong to the same period of the periodic table.
- (3) Z forms an ion carrying two negative charges.

- A (1) and (2) only
- B (1) and (3) only
- C (2) and (3) only
- D (1), (2) and (3)

14. Element X has an atomic number 19 and element Y has an atomic number 35. The chemical formula of the compound they form is most likely to be

- A XY.
- B X<sub>2</sub>Y.
- C XY<sub>2</sub>.
- D XY<sub>3</sub>.

15. An atom of element X has 12 protons while an atom of element Y has 7 electrons. What is the chemical formula of the compound formed between X and Y?

- A XY
- B X<sub>2</sub>Y
- C X<sub>2</sub>Y<sub>3</sub>
- D X<sub>3</sub>Y<sub>2</sub>

16. An ionic compound has a chemical formula  $XY$ . All ions in the compound have the electronic arrangement as a neon atom. What are elements X and Y?
- |   | <u>X</u>  | <u>Y</u> |
|---|-----------|----------|
| A | Sodium    | chlorine |
| B | Magnesium | oxygen   |
| C | Calcium   | bromine  |
| D | Lithium   | fluorine |
17. The atomic numbers of X and Y are 3 and 7 respectively. What is the chemical formula of the compound formed between X and Y?
- A  $X_2Y$   
 B  $XY_2$   
 C  $XY_3$   
 D  $X_3Y$
18. Elements X and Y react to form an ionic compound with a chemical formula  $X_2Y$ . If X belongs to Group I of the periodic table, to which group would Y belong?
- A II  
 B III  
 C VI  
 D VII
19. The chemical formula of an ionic compound is  $XY_3$ . The compound could be
- A calcium nitride.  
 B copper(II) sulphide.  
 C iron(III) chloride.  
 D sodium hydride.
20. Element X and Y react to form an ionic compound with a chemical formula  $X_2Y_3$ . If Y belongs to Group VI of the periodic table, to which group would X belong?
- A I                                      B II                                      C III                                      D IV
21. W, X, Y and Z are four consecutive elements of the periodic table. X is a noble gas. Which of the following chemical formulae is correct?
- A  $Y_2W$   
 B  $YW_2$   
 C  $ZW_2$   
 D  $Z_2W$
22. Barium (Ba) is an alkaline earth metal. The chemical formula of its carbonate is
- A  $BaCO_3$ .  
 B  $Ba_2CO_3$ .  
 C  $Ba(CO_3)_2$ .  
 D  $Ba_3(CO_3)_2$ .

23. The chemical formula of the oxide of indium (In) is  $\text{In}_2\text{O}_3$ . What is the chemical formula of indium nitrate?
- A  $\text{InNO}_3$   
B  $\text{In}_2(\text{NO}_3)_2$   
C  $\text{In}(\text{NO}_3)_2$   
D  $\text{In}(\text{NO}_3)_3$
24. The chemical formula of the nitride of metal X is  $\text{X}_3\text{N}_2$ . The chemical formula of the sulphate of X is
- A  $\text{XSO}_4$ .  
B  $\text{X}_2\text{SO}_4$ .  
C  $\text{X}(\text{SO}_4)_2$ .  
D  $\text{X}_2(\text{SO}_4)_3$ .
25. Caesium (Cs) is a Group I element and its relative atomic mass is greater than that of potassium. Which of the following statements concerning caesium is INCORRECT?
- A It is a soft metal.  
B It reacts with water to give an alkaline solution.  
C It reacts with chlorine to form an ionic compound.  
D All of its compounds are coloured.
26. Consider the following compounds. Which of the underlined particles does NOT have an octet structure in the outermost shell?
- A Li $_2\text{O}$   
B Ca $\text{F}_2$   
C Mg $_3\text{N}_2$   
D Na $_2\text{S}$
27. The element barium (Ba) has an atomic number 56. Which of the following statements concerning barium is INCORRECT?
- A It gives a characteristic flame colour in flame test.  
B It can be obtained by electrolyzing molten barium chloride.  
C Its carbonate is very soluble in water.  
D The chemical formula of its sulphate is  $\text{BaSO}_4$ .
28. X is an element. It can form a cation  $\text{X}^{2+}$  with an electronic arrangement 2,8,8. Which of the following statements concerning X is correct?
- A X is in Period 3 of the periodic table.  
B X is a transition metal.  
C X forms a coloured salt with chlorine.  
D The chemical formula of the nitrate of X is  $\text{X}(\text{NO}_3)_2$ .
29. What is the colour of an aqueous solution of iron(III) nitrate?
- A Pale green   B Yellow-brown   C Blue   D Pink

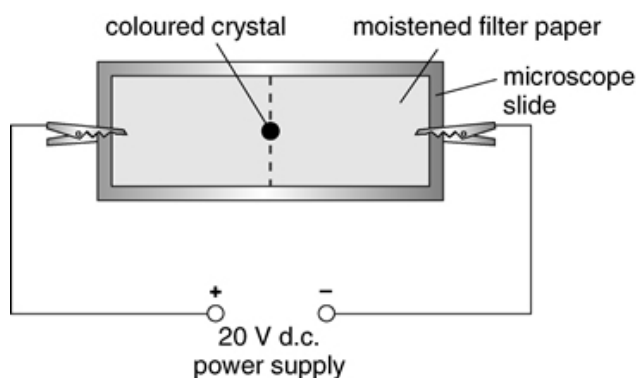
30. Which of the following combinations is correct?

	<u>Ion</u>	<u>Colour of ion in aqueous solution</u>
A	Bromide	orange
B	Calcium	Brick-red
C	Iron(II)	blue
D	Permanganate	purple

31. Which of the following compounds is coloured?

- A Ammonium dichromate
- B Calcium hydroxide
- C Lithium chloride
- D Lead(II) nitrate

32.



A colour moves towards the left in the above set-up. The coloured crystal on the filter paper could be

- A chromium(III) sulphate.
- B iron(III) chloride.
- C potassium permanganate.
- D sodium sulphate.

33. Which of the following ions is responsible for the green colour of jade?

- A  $\text{Cr}^{3+}$
- B  $\text{Cu}^{2+}$
- C  $\text{Fe}^{3+}$
- D  $\text{Mn}^{3+}$

34. The table below shows the colour of the aqueous solutions of three ionic compounds.

<b>Compound</b>	<b>Colour of aqueous solution</b>
WX	yellow
YX	colourless
YZ	purple

Which of the following combinations about the colour of the ions is most likely to be correct?

	<u><math>\text{W}^{2+}(\text{aq})</math></u>	<u><math>\text{X}^{2-}(\text{aq})</math></u>	<u><math>\text{Y}^{2+}(\text{aq})</math></u>	<u><math>\text{Z}^{2-}(\text{aq})</math></u>
A	colourless	colourless	colourless	colourless
B	colourless	yellow	purple	colourless
C	yellow	colourless	colourless	purple
D	yellow	yellow	purple	purple

35. Two elements X and Y react together to form a compound with a chemical formula XY. X and Y could be
- (1) lithium and fluorine.
  - (2) magnesium and sulphur.
  - (3) sodium and hydrogen.
- A (1) and (2) only  
B (1) and (3) only  
C (2) and (3) only  
D (1), (2) and (3)
36. Which of the following statements concerning the ionic compound formed between calcium and nitrogen are correct?
- (1) Each calcium ion in the compound carries two positive charges.
  - (2) Each nitride ion in the compound has a duplet structure in the outermost shell.
  - (3) The chemical formula of the compound formed is  $\text{Ca}_3\text{N}_2$ .
- A (1) and (2) only  
B (1) and (3) only  
C (2) and (3) only  
D (1), (2) and (3)
37. X is an element. It can form an ion  $\text{X}^+$  which has an electronic arrangement 2,8,8. Which of the following statements concerning X is / are correct?
- (1) X is a Period 3 element.
  - (2) The sulphate of X is colourless.
  - (3) The chemical formula of the oxide of X is  $\text{X}_2\text{O}$ .
- A (1) only  
B (2) only  
C (1) and (3) only  
D (2) and (3) only
38. Which of the following statements concerning fluorine are correct?
- (1) Fluorine is in Period 2 of the periodic table.
  - (2) The chemical formula of the compound formed between fluorine and calcium is  $\text{CaF}_2$ .
  - (3) Fluorine forms a coloured salt with sodium.
- A (1) and (2) only  
B (1) and (3) only  
C (2) and (3) only  
D (1), (2) and (3)
39. The element astatine (At) has an atomic number 85. Which of the following statements concerning astatine are correct?
- (1) It is a halogen.
  - (2) It is a coloured solid.
  - (3) The chemical formula of the compound formed between astatine and potassium is  $\text{K}_2\text{At}$ .
- A (1) and (2) only  
B (1) and (3) only  
C (2) and (3) only    D (1), (2) and (3)

40. Consider the following three elements:

Element	X	Y	Z
Atomic number	11	17	19

Which of the following statements concerning X, Y and Z is / are correct?

- (1) X reacts with Y to form common salt.
- (2) Y forms a coloured salt with Z.
- (3) X reacts with Z to form an ionic compound.

A (1) only                      B (2) only                      C (1) and (3) only                      D (2) and (3) only

41. Element X (atomic number 12) combines with element Y (atomic number 7) to form compound Z. Which of the following statements is / are correct?

- (1) X forms a stable ion carrying two positive charges.
- (2) Y forms a stable ion carrying one negative charge.
- (3) The chemical formula of Z is  $X_3Y_2$ .

A (1) only                      B (2) only                      C (1) and (3) only                      D (2) and (3) only

42. Which of the following ions is / are green in colour?

- (1)  $Fe^{3+}(aq)$
- (2)  $Ni^{2+}(aq)$
- (3)  $Cr_2O_7^{2-}(aq)$

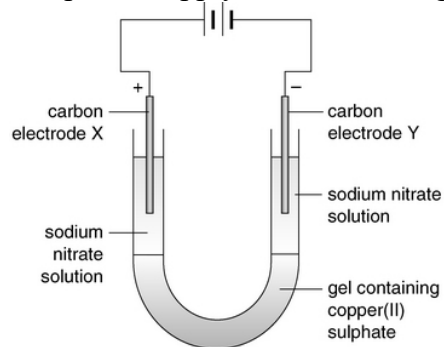
A (1) only                      B (2) only                      C (1) and (3) only                      D (2) and (3) only

43. Which of the following compounds is / are coloured?

- (1) Copper(II) carbonate
- (2) Magnesium sulphate
- (3) Zinc chloride

A (1) only                      B (2) only                      C (1) and (3) only                      D (2) and (3) only

44. The power supply in the following set-up is connected for about 30 minutes.



Which of the following statements concerning the set-up is / are correct?

- (1) A purple colour develops near electrode X.
- (2) A blue colour develops near electrode Y.
- (3) Sulphate ions move towards electrode Y.

A (1) only  
 B (2) only  
 C (1) and (3) only                      D (2) and (3) only

1 <u>B</u>	2 <u>A</u>	3 <u>C</u>	4 <u>C</u>	5 <u>A</u>
6 <u>C</u>	7 <u>D</u>	8 <u>C</u>	9 <u>B</u>	10 <u>D</u>
11 <u>B</u>	12 <u>A</u>	13 <u>D</u>	14 <u>A</u>	15 <u>D</u>
16 <u>B</u>	17 <u>D</u>	18 <u>C</u>	19 <u>C</u>	20 <u>C</u>
21 <u>C</u>	22 <u>A</u>	23 <u>D</u>	24 <u>A</u>	25 <u>D</u>
26 <u>A</u>	27 <u>C</u>	28 <u>D</u>	29 <u>B</u>	30 <u>D</u>
31 <u>A</u>	32 <u>C</u>	33 <u>A</u>	34 <u>C</u>	35 <u>D</u>
36 <u>B</u>	37 <u>D</u>	38 <u>A</u>	39 <u>A</u>	40 <u>A</u>
41 <u>C</u>	42 <u>B</u>	43 <u>A</u>	44 <u>B</u>	



