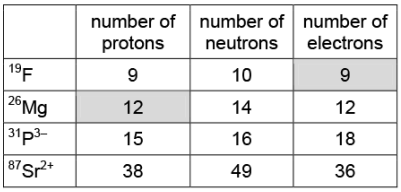
01. 0620_s17_ms_41 Q: 1

| | | |
|---|---|---|
| (a) | *proton number*: the number of protons | 1 |
| | *nucleon number:* the total number of protons and neutrons | 1 |
| | *nucleon number:* in the nucleus / nuclei (of an atom) | 1 |
| (b) | (hydrogen is the only atom to have) no neutrons | 1 |
| (c) |  | |

| | number of protons | number of neutrons | number of electrons |
|---|---|---|---|
| $^{19}F$ | 9 | 10 | 9 |
| $^{26}Mg$ | 12 | 14 | 12 |
| $^{31}P^{3-}$ | 15 | 16 | 18 |
| $^{87}Sr^{2+}$ | 38 | 49 | 36 |

| | | |
|---|---|---|
| | fluorine protons **AND** neutrons correct | 1 |
| | magnesium neutrons **AND** electrons correct | 1 |
| | phosphorus protons **AND** neutrons correct | 1 |
| | phosphorus electrons correct | 1 |
| | strontium protons **AND** neutrons correct | 1 |
| | strontium electrons correct | 1 |
| (d)(i) | $MgF_2$ | 1 |
| (d)(ii) | $Sr_3P_2$ | 1 |

02. 0620_w17_ms_42 Q: 2

| | | |
|---|---|---|
| (a) | *Si:* 2: 8 : 4 | 1 |
| | *$Ca^{2+}$:* 2 : 8: 8 | 1 |
| | *$N^{3-}$:* 2 : 8 | 1 |
| (b) | $Ca_3N_2$ | 1 |
| (c) | Li shown as having one shell with 2 electrons **OR** no electrons **OR** no outer shell | 1 |
| | *Cl* shown as having an outer shell of 7 electrons of one type, plus one different electron which matches Li electrons | 1 |
| | '+' charge on Li **AND** '–' charge on *Cl* | 1 |

| | | |
|---|---|---|
| (d) | two shared pairs of electrons | 1 |
| | both *Cl* with complete outer shells | 1 |
| | S with complete outer shell | 1 |
| (e) | $SCl_2$ has intermolecular forces (of attraction) | 1 |
| | LiCl has (electrostatic) forces (of attraction) between ions | 1 |
| | intermolecular forces are weaker / less energy is needed to break intermolecular forces | 1 |
| (f) | silicon(IV) oxide | 1 |

03. 0620_s15_ms_33 Q: 1

| | | | |
|---|---|---|---|
| (a)(i) | $AlF_3$; | **1** | |
| (a)(ii) | $As_2O_3$; | **1** | **A** $As_2O_5$ |
| (a)(iii) | $SiBr_4$; | **1** | |
| (b)(i) | $P^{3-}$; | **1** | |
| (b)(ii) | $Ba^{2+}$; | **1** | |
| (b)(iii) | $Fr^{+}$; | **1** | |
| (c) | M1 2 double bonds, one between each O and the C atom;<br>M2 each O has 8 outer electrons;<br>M3 each C has 8 outer electrons; | **3** | **R** wrong symbols for O for M2<br>**R** wrong symbols for C for M3<br>**I** missing symbols<br>**A** any combination of x and o |

04. 0620_w15_ms_31 Q: 2

| | | |
|---|---|---|
| (a) | add a (dilute) acid;<br>filter;<br>copper does not react or dissolve / zinc reacts or dissolves or forms a salt; | **1**<br>**1**<br>**1** |
| (b) | diffusion (through a membrane);<br>nitrogen diffuses faster;<br>because it has the smaller $M_r$;<br>**or**<br>(turn into) liquid;<br>(fractional) distillation;<br>different boiling points;<br>**or**<br>burn a named substance to make non-gaseous product;<br>oxygen reacts / nitrogen does not react;<br>name of product of combustion; | **3** |
| (c) | chromatography;<br>use a locating agent / the two acids move at different rates / alanine travels faster / alanine higher up paper / travels further; | **1**<br>**1** |
| (d) | add sodium hydroxide solution;<br>filter;<br>zinc hydroxide (is amphoteric it) will react or will dissolve / magnesium hydroxide does not react or does not dissolve; | **1**<br>**1**<br>**1** |