1. answers apply to:

accept diagrams and/or descriptions

carbon dioxide CO_2

ammonia NH_3

methane CH_4

water H_2O

*outer electronic structure of one atom correct **or** needs correct number of electrons to complete outer shell

1

*outer electronic structure of other atom correct **or** needs correct number of electrons to complete outer shell

1

*one shared **pair** of electrons (as one covalent bond)

use of ions or reference to ionic bonding negates this mark

1

*outer electronic structure of compound correct **or** each atom now has a full outer shell/noble gas electron structure

1

[4]

2. (a) *weaker bonds*

allow (other substances) react with the silicon dioxide

or

fewer bonds

ignore weaker / fewer forces

or

disruption to lattice

*do **not** accept reference to intermolecular forces / bonds*

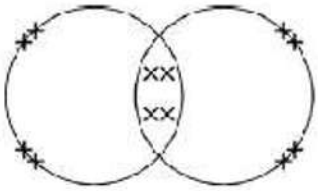
1

(b) (i) Na_2O

*do **not** accept brackets or charges in the formula*

1

(ii)



electrons can be shown as dots, crosses, e or any combination

2 bonding pairs

accept 4 electrons within the overlap

1

2 lone pairs on each oxygen

accept 4 non-bonding electrons on each oxygen

1

(c) *lattice / regular pattern / layers / giant structure / close-packed arrangement*

1

(of) positive ions **or** (of) atoms

1

(with) delocalised / free electrons

*reference to incorrect particles **or** incorrect bonding **or** incorrect structure = max **2***

1

[7]

3. (a) any **two** from

assume it = methanol

allow converse for water

- shorter / quicker soaking time

  allow it is quicker

- takes less time / quicker to dry

  or faster evaporation

- dissolves quicker / better in methanol

2

(b) (i) CH_4O

1

(ii) covalent

1

(c) it is made of small molecules

1

[5]

4. (a)

$\frac{6.21}{207}$ $\frac{0.64}{16}$

1 *mark for dividing mass by* A_r
max ***2*** *if* A_r *divided by mass*

1

= 0.03 = 0.04

1 *mark for correct proportions*

1

3 4

1 *mark for correct whole number ratio (allow multiples) can be awarded from correct formula*

1

Pb_3O_4

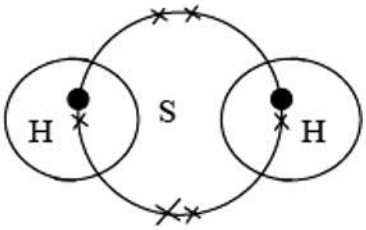
1 *mark for correct formula*

ecf *allowed from* ***step 2 to step 3*** *and* ***step 3 to step 4*** *if sensible attempt at* ***step 1***

correct formula with no working gains ***2*** *marks*

1

(b) (i)



allow all dots ***or*** *all crosses* ***or*** *e* ***or*** e^-

ignore inner shells and any inner electrons

allow 4 non-bonded electrons anywhere on shell as long as not in overlap – need not be paired

1

(ii) forces of attraction / bonds <u>between</u> molecules are weak (owtte)

*do **not** accept intramolecular forces / covalent bonds are weak*

*do **not** accept reference to ions*

or

<u>intermolecular</u> forces / bonds are weak (owtte)

or

it is made of small molecules with weak forces of attraction

*if **2** marks not awarded*

*made of small molecules / simple molecular gains **1** mark*

*forces of attraction are weak (without specifying between molecules / intermolecular) gains **1** mark*

(accept easily broken / not much energy needed to break instead of weak)

bonds are weak without specifying intermolecular would not gain a mark and would be ignored

2

(iii) 4

1

[8]

5. (a) C_3H_8

capital letters for symbols numbers must be halfway or lower down the element symbol

allow H_8C_3

*do **not** allow 3:8 **or** C_3 and H_8*

1

(b) (i) electron

1

(ii) covalent

1

(c) low **and** small

*both for **1** mark*

1

[4]