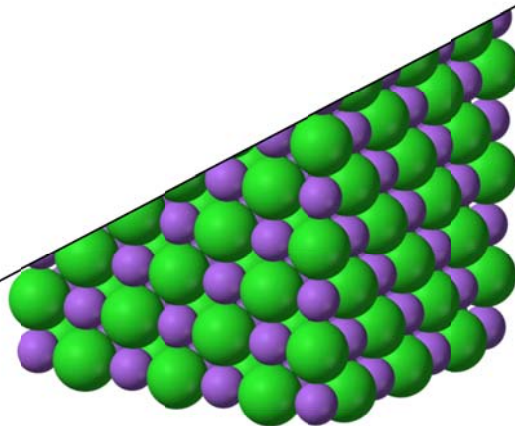


Farr High School



NATIONAL 5 CHEMISTRY

Chemistry
ANSWERS



Exam Questions

Chemical Changes and Structure PPO answers

Rates of Reaction

1. $\frac{32 - 10}{8} = 2.75$ (1) accept 2.8
2. scales correct and both labels and units correct (1)
plotting of points and joining of points (1)
Max of 1 mark if bar graph/spike graph (labels, units and scale) or if both scales taken from table
Allow $\frac{1}{2}$ box tolerance on plotting of points for each
Allow 1 plotting error
Axes can be reversed
3. Answer 0.0015 (1) Units not required
4. 0.017 (1) Units not required
5. D (1)
6. C (1)
7. A (1)
8. D (1)
9. (a) scales correct and both labels and units correct (1)
plotting of points and joining of points (1)
Max of 1 mark if bar graph/spike graph (labels, units and scale) or if both scales taken from table
Allow $\frac{1}{2}$ box tolerance on plotting of points for each
Allow 1 plotting error
Axes can be reversed

(b) Must check reading from graph 0.5 tolerance (1)
No graph drawn 34-35

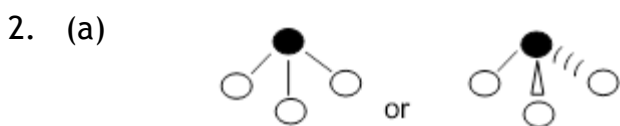
(c) $(2.2 - 1.2) / 10 = 0.1$ (1)
10. (a) points and line correct (1)

(b) $1 / 0.0125 = 80$ secs (1)

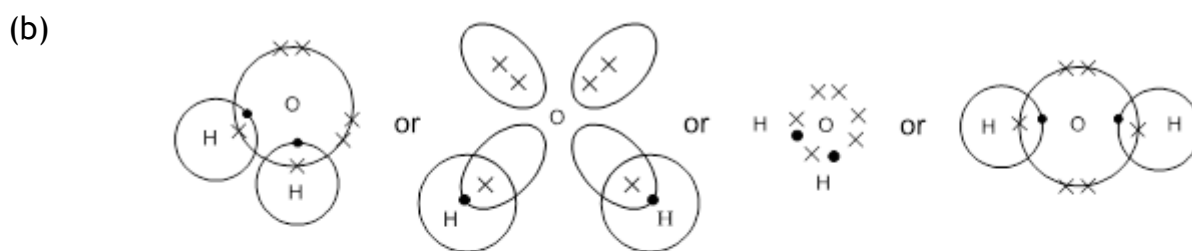
Atomic Structure and Bonding Related to Properties of Materials

1. (a) 1st – covalent network (accept covalent lattice)
 2nd – ionic lattice
 3rd – metallic lattice
 4th – discrete covalent/covalent molecular (2)
 ½ mark each
 accept abbreviations if obvious

- (b) SiO₂
 O₂Si
 Simplest ratio (1)



Use professional judgement to establish pyramidal shape
 Accept symbols, colours other way around (1)

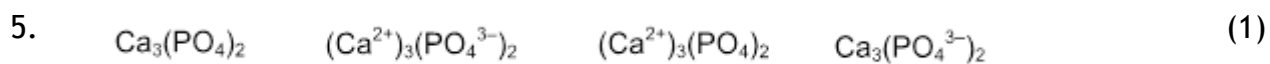


At least one of the symbols must be shown
 Mixture of dots and crosses are acceptable
 All dots or crosses acceptable
 Ignore inner electrons on oxygen
 Allow for 1 slip for misplaced electron (professional judgement)
 Accept electron pair on line of touching circles
 Non shared electrons do not need to be in pairs (1)

3. RuCl₂ Ru²⁺(Cl)₂ Cl₂Ru Ru₁Cl₂ (1)

If ionic formula used it must be fully correct

4. Ca₁₀(PO₄)₆F₂
 F can be in brackets (F)₂
 Accept any order of symbols
 Ignore charges
 Use professional judgment for size of numbers in formula (1)



6. sodium phosphate (1)

7. (a)

Proton = 1
Neutron = 2
Electron = 1 (1)

All 3 for 1 mark

(b) Protium/
Top one/
1 (1)

8. (a) (i) $\begin{array}{c} 63 \\ \text{Cu} \\ 29 \end{array}$ (1)

(ii) 34 (1)

(b) 64 (1)

9. Hg^{2+}
 $\text{Hg}^{2+}\text{S}^{2-}$
 Hg^{2+}S

Ignore state symbols (1)

10. (a) Any suitable diagram showing symbols N,F and **all outer electrons** not just the shared pairs

Cross dot (with or without circles) or similar type of diagram, lobes or petals

2 non-bonding electrons need to be shown on N, but not in an overlap area

Non-bonding electrons needn't be in pairs

N and F symbols can be missed

(1)

(b)  (1)

11. Any suitable diagram showing two hydrogen atoms with two electrons in the overlapped area



(1)

12. $(\text{NH}_4^+)_3\text{PO}_4^{3-}$ (1)

13. (a) Ionic (1)
Ionic lattice
Ionic network

(b) As concentration increases/decreases freezing point decreases/increases
The freezing point decreases/increases as concentration increases/decreases
As concentration increases freezing point gets colder (1)

(c) -1.8 to -2.0 inclusive (1)

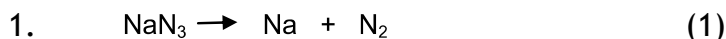
14. (a) As the percentage increases...the density decreases
As the percentage decreases...the density increases
Density increases as percentage decreases (1)
Density decreases as percentage increases

(b) 20 (1)

15. Al_2O_3
If ion charges are shown all must be correct
 $(\text{Al}^{3+})_2 (\text{O}^{2-})_3 / \text{Al}_2^{3+} \text{O}_3^{2-}$ (1)

16. Two positive, 2+, Co^{2+} (1)

Formulae and Reaction Quantities



Ignore state symbols and attempts to balance.

Allow electricity over the arrow.

2. (a) $2 \times 0.25 = 0.5$ $\frac{1}{2}$ $\frac{1}{2}$
0.5 no working 1 (1)

(b) GFM $\text{Fe}_2\text{O}_3 = 160$ $\frac{1}{2}$
Moles of $\text{Fe}_2\text{O}_3 = \frac{0.5}{2} = 0.25$
or mole ratio stated $\frac{1}{2}$
 $\text{Fe}_2\text{O}_3 : \text{H}_3\text{PO}_4$
1 : 2

Mass of $\text{Fe}_2\text{O}_3 = 0.25 \times 160 = 40$ $\frac{1}{2}$ $\frac{1}{2}$

Or 40 on its own (2)

Allow follow through using number of moles from part (i) if show working
If atomic number is used instead of mass – max 1 mark

If use ratio 1:1 80g 1 $\frac{1}{2}$ if show working (2)

3. 1 mol 2 mol ($\frac{1}{2}$ mark)
60 34 ($\frac{1}{2}$ mark)
90 $\frac{90 \times 34}{60} = 51$ (1 mark)

51 on its own = 2 marks

.....
 $\frac{90}{60} = 1.5$ mol ($\frac{1}{2}$ mark)

1 mol \rightarrow 2 mol ($\frac{1}{2}$ mark)

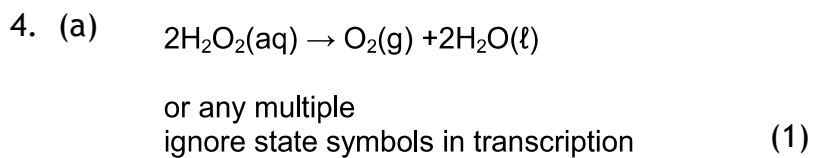
1.5 mol \rightarrow 3 mol ($\frac{1}{2}$ mark)

Mass = $3 \times 17 = 51$ ($\frac{1}{2}$ mark)

Use of atomic numbers max 1 mark – Must have working

Deduct ($\frac{1}{2}$) mark for arithmetic error

Also accept 50.4, 50.9, 51.3 on its own = 2 marks (2)



(b) $34 \text{ g} \rightarrow 12 \text{ l}$
 $1.7 \text{ g} \rightarrow 1.7/34 \times 12$ ½ mark
 $= 0.6$ ½ mark

0.6 on own – 1 mark

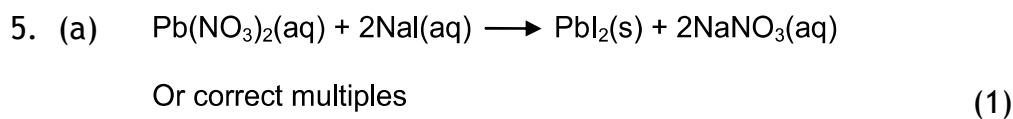
OR

No moles = $1.7/34 = 0.05$
 Vol = 0.05×12 ½ mark
 $= 0.6$ ½ mark

OR

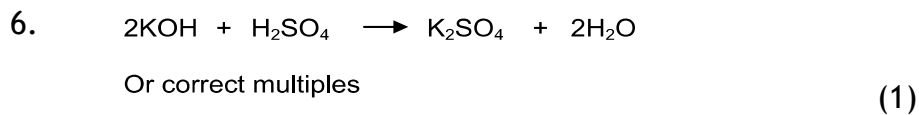
$34/1.7 = 20$, then $12/20$ ½ mark
 $= 0.6$ ½ mark

(1)



(b) Moles $n = c \times v$ (½ mark)
 $= 0.1 \times 0.02$ moles (if 20 used max ½ mark)
 $= 0.002$ moles (½ mark)

0.002 on its own 1 mark (1)



7. $n = c \times v$
 $n = 0.1 \times 0.05$ (½)
 $n = 0.005$ moles (½)
 0.005 on its own 1 mark
 Deduct ½ if 50cm^3 not in litres (0.05) (1)

8. (a) 25g (1)

(b) (allow follow through from (c)(i))

$$(25/27 =) \frac{1}{2} 0.926 / 0.93 \frac{1}{2}$$

0.926, 0.93 or 0.9 on its own (1 mark)

if atomic numbers used (1.9) maximum $\frac{1}{2}$ mark (1)

9. 1 mole $N_2 = 28$ g

$$7/28 = 0.25 \text{ moles } (\frac{1}{2})$$

0.25 to 0.5 (1 mole to 2 moles) ($\frac{1}{2}$)

1 mole $NF_3 = 71$ g ($\frac{1}{2}$ for **both** formula masses)

$$71 \times 0.5 = \underline{35.5} (\frac{1}{2})$$

35.5 on its own 2 marks

$$1 : 2 (\frac{1}{2})$$

$$28 : 142 (\frac{1}{2})$$

$$1 \longrightarrow 142/28 (\frac{1}{2})$$

$$7 \longrightarrow 142 \times 7/28 = \underline{35.5} (\frac{1}{2})$$

or any other acceptable method (2)

10. (n = c x V)

$$n = 0.05 \times 0.02 (\frac{1}{2})$$

$$n = \underline{0.001} (\frac{1}{2})$$

If 20 cm^3 used in place of 0.02 (- $\frac{1}{2}$)

Using wrong substance i.e. 0.025 (- $\frac{1}{2}$) (1)

Acids and Bases

1. (pH) will rise towards 7/
(pH) will rise/
(pH) becomes less acidic/
increases/
becomes neutral (1)

2. (a) $\text{Ba}^{2+}_{(\text{aq})} + \text{SO}_4^{2-}_{(\text{aq})} \rightarrow \text{Ba}^{2+}\text{SO}_4^{2-}_{(\text{s})}$
State symbols not required (1)

(b) Spectator ions/spectate (1)

3. a higher (1)

4. Copper carbonate CuCO_3 (1)

5. Neutralisation (1)

6. (a) Red/pink/orange/yellow (1)
(b) Line must be increasing }
Line stops at pH7 or below } or 0 (1)

7. D (1)

8. A (1)

9. A (1)

10. A (1)

11. (a) Paper X – Blue; Paper Y - Red Both correct (1)
(b) Ammonium chloride (correct formula accepted) (1)