

Chemistry A (1530)

Paper 4H

MARK SCHEME – Summer 2003

1. (a) An explanation to include:
1. yeast contains enzyme / catalyst / zymase;
2. speeds up process; 2
- (b) A suggestion to include:
1. denatures / damages enzyme / fungus;
[Reject kills]
2. stop fermentation; 2
- plus one communication mark for presenting relevant information in a form that suits its purpose 1
[In bullet points or complete sentences]
[Must score at least one chemistry mark]
- (c) (i) sodium ion - flame test; [Reject burn]
yellow / yellow – orange; 2
- (ii) chloride ion - silver nitrate;
white (precipitate);
(dilute) nitric acid; 3
- (d) (i) $C_3H_7O_2Cl$; 1
- (ii) 110.5;
[Allow ecf for reasonable formula] 1
- Total 12 marks**
2. (a) improved strength / OWTTE; 1
- (b) stronger / does not corrode / other reasonable property /
idea of property modification;
[Reject cost] 1
- (c) (i) A suggestion to include two from:
1. journal / **scientific** magazines;
[Reject newspapers]
2. conference / lecture / demonstrations;
3. internet / web sites; 2
4. books;
[Reject letter / telephone / TV / radio / text message / email]

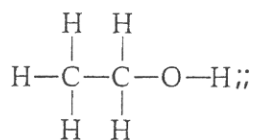
- (ii) carry out experiments **qualified**; 1
- (iii) smaller / faster computers etc; 1
[Reject cost]
- (d) (i) carbon dioxide; 1
- (ii) downward delivery / over water / (gas) syringe / 1
upward displacement **of air**;
[No ecf allowed]

Total 8 marks

3. (a) $2\text{NaOH (aq)} + \text{H}_2\text{SO}_4 \text{(aq)} \rightarrow \text{Na}_2\text{SO}_4 \text{(aq)} + 2\text{H}_2\text{O (l)}$
 reactants;
 products;
 balancing correct formulae;
 state symbols for any three of **these** four species; 4
- (b) (i) pipette / burette; 1
- (ii) burette; 1
- (iii) phenolphthalein / methyl orange / suitable indicator; 1
[Reject litmus / universal]
- (iv) pink (for phenolphthalein) / 1
yellow (for methyl orange) /
colours for allowed indicator;
- (v) colourless (for phenolphthalein) [Reject clear] / 1
pink or red or orange (for methyl orange) /
colours for allowed indicator;
- (c) A calculation to include:
 1. moles of NaOH = $\frac{25.0 \times 0.200}{1000} = 0.005 \text{ (mol)}$;
 2. moles of HNO₃ = 0.005 (mol);
 3. concentration of HNO₃ = $\frac{0.005}{42.3} \times 1000 = 0.118 /$
 0.12 (mol dm⁻³);
 [Reject incorrect unit] 3

Total 12 marks

4. (a)



[Deduct 1 mark for 1 error e.g. OH]

2

(b)

Any three from:

1. (ethanol) oxidised;
2. by air / oxygen;
3. to form (ethanoic) acid;
4. (ethanoic) **acid** tastes/is vinegary;
5. mention of **vinegar** fly / bacteria;

3

(c) (i)

correct choice of scale;

[Vertical scale must occupy at least half of y axis]

all points correctly plotted;

curve of best fit / straight line;

3

(ii)

reading from their graph °C;

[**unit required**]

1

(iii)

Any two from:

1. general formula / differs by CH₂ / increasing molecular size;
2. similar chemical properties;
3. gradual change in physical properties / increasing molecular size;
4. same functional group (e.g. OH)

2

(iv)

Any three from:

1. combustion / reacts with oxygen;
2. producing carbon dioxide;
3. water;

max 3

Any three from:

1. esterification / reacts with carboxylic acids;
2. producing esters
3. acid catalyst;
4. heat / warm;

max 3

Any three from:

1. oxidation;
2. producing carboxylic acid;
3. named oxidizing agent;
4. refluxing;
5. catalyst;

max 3

Any three from:

1. dehydration;
2. producing alkene;
3. catalyst;
4. heating

max 3

Any other suitable reaction with two further relevant points

6

Total 17 marks

5. (a) $\text{Fe}^{2+} + 2\text{OH}^- \rightarrow \text{Fe}(\text{OH})_2$
 reactants;
 product;
 balancing correct formulae; 3
- (b) green precipitate / green solid; 1
- (c) A calculation to include:
 1. $\text{Fe}(\text{OH})_3 = 56 + 3 \times 1.0 + 3 \times 16 = 107$;
 2. moles of $\text{Fe}(\text{OH})_3 = \frac{5.35}{107} = 0.05$ (mol);
 3. maximum volume formed = $\frac{3}{2} \times 0.05 \times 60 = 4.5$ (dm³); 3
- (d) A calculation to include:
 1. Fe = 72.4% O = 27.6%;
 2. $\frac{72.4}{56} = 1.293$ $\frac{27.6}{16} = 1.725$;
 3. 1 1.33;
 4. Fe_3O_4 ; 4

Total 11 marks

Total Mark 60