Gateways School

**Organic analysis**

**Revision PPQ Answers**

40 marks

**Q1.**

(a)     Allow 1 mark each for any correctly drawn primary, secondary and
tertiary alcohol of molecular formula C4H8O

**3**

          Tertiary alcohol cannot be oxidised

**1**

(b)     Region 1500–400 cm–1

**1**

exact match to spectrum of known compound

**1**

(c)                       **A**                                               **B**       CH3CH2CH2OH                       CH3CH2–O–CH3 **(1)**or CH3CH(OH)CH3 **(1)**

                           **C**                                               **D**       one alkene e.g.                     one cycloalkane e.g.

|  |  |
| --- | --- |
| CH2=CHCH2CH2CH3CH3–CH=CH–CH2CH3(CH3)2C=CHCH3H2C=C(CH3)CH2CH3 | **(1)** etc |

                           **E**                                                **F**      CH3CH2CHO **(1)**                         CH3COCH3 **(1)**

**6**

**[12]**

**Q2.**

(a)     Secondary ***OR***2° (alcohol);

**1**

(b)     Spectrum is for **butanone (or formula) or butan-2-one**

*The explanation marks depend on correctly identifying butanone.*

          If butanone is correctly identified, award any two from

•        (Strong) absorption / peak at approximately 1700 (cm–1) /
1710 (cm–1) / in the range 1680 – 1750 (cm–1) This
needs to be stated.

•        (Characteristic) absorption / peak for C=O (may be shown
on the spectrum in the correct place).

•        No absorption / peak in range 3230 to 3550 cm–1.

**1**

•        No absorption / peak for an OH group.

*Look at the spectrum to see if anything is written on it that might gain credit.
Allow the words “dip” OR “spike” OR “low transmittance” as alternatives for absorption.*

**2**

(c)     Displayed structure for 2-methylpropan-2-ol


*Must have* ***all bonds*** *drawn out but ignore the bond angles*

**1**

**[5]**

**Q3.**

(i)      More absorption/less transmittance of infrared radiation
by it/water vapour

***OR*** broader absorption by OH

***OR*** less absorption/more transmittance of infrared radiation
       by carbon dioxide

*Must be comparative*

*This may be described and must not be contradictory*

*Credit answers which refer correctly to “transmittance”*

*(more absorption = less transmittance)*

**1**

(ii)      **M1**    CO2 contains C=O (stated like this or in words or strongly
implied) OR is O=C=O

**M2    depends on correct M1**

***OR*** expected absorption/peak (for C=O) is missing

***OR*** expected absorption/peak (for C=O) is shifted to 2300 (cm–1)

***OR*** asymmetric stretching is occurring (due to C=O)

*If M1 and M2 not scored, give one mark for either*

*No absorption/peak at 1700 (cm–1)/1715 (cm–1)*

*OR no absorption in the range 1680 – 1750 (cm–1)*

*Ignore “carbon-oxygen bonds”, “C-O bonds”*

*Ignore reference to other absorptions*

*For M2*

*Allow “dip” OR “spike” OR “low transmittance” as alternatives for absorption.*

**2**

**[3]**

**Q4.**

(a)     (i)      Green

*Ignore shades of green.*

**1**

(ii)     Excess acidified potassium dichromate(VI)

**1**

Reflux (for some time)

**1**

In the diagram credit should be given for

•        a vertical condenser

*Lose M3 and M4 for a distillation apparatus.*

**1**

•        an apparatus which would clearly work

*Do not allow this mark for a flask drawn on its own.*

*Penalise diagrams where the apparatus is sealed.*

**1**

(iii)    Distillation

**1**

Immediately (the reagents are mixed)

**1**

(b)     Keep away from naked flames

*Allow heat with water-bath or heating mantle.*

*If a list is given ignore eye protection, otherwise lose this mark.*

**1**

(c)     (i)      Tollens’ or Fehling’s reagents

*Incorrect reagent(s) loses* ***both*** *marks.*

*Accept mis-spellings if meaning is clear.*

**1**

Silver mirror / red ppt. formed

*Accept ‘blue to red’ but not ‘red’ alone.*

**1**

(ii)     Sodium carbonate (solution) / Group II metal

*Allow indicator solutions with appropriate colours.*

*Accept any named carbonate or hydrogen carbonate.*

**1**

Effervescence / evolves a gas

*Accept ‘fizzes’.*

**1**

(d)     Propanoic acid

*If this mark is lost allow one mark if there is reference to stronger intermolecular forces in the named compound.*

*Lose M1 and M3.*

**1**

Contains hydrogen bonding

**1**

Some comparison with other compounds explaining that the intermolecular forces are stronger in propanoic acid

**1**

**[15]**

**Q5.**

Acidified potassium dichromate

*Accept words or formulae.*

*Accept acidified potassium permanganate.*

*Accept Lucas reagent (conc HCl, ZnCl2) (cloudy in 5 mins for 2°, instantly for 3°).*

*Mark on for incomplete reagent.*

*Incorrect reagent CE = 0 / 3*

*Inclusion of Tollen’s etc with acidified potassium dichromate is incorrect reagent.*

*Not no reaction.*

Either

Obs with 2-methylpropan-2-ol

No visible change

**1**

Obs with butan-2-ol

Orange to green (both colours needed)

**1**

or

|  |  |
| --- | --- |
| Obs with 2-methylpropan-2-ol | orange |
| Obs with butan-2-ol | green |

**[3]**

**Q6.**

B

**[1]**

**Q7.**

D

**[1]**