

40 The purity of a compound can be determined using infrared spectroscopy.

The table gives the characteristic infrared absorption frequencies for some selected bonds.

bond	functional groups containing the bond	characteristic infrared absorption range (in wavenumbers)/ cm^{-1}
C–O	hydroxy, ester	1040–1300
C=C	aromatic compound, alkene	1500–1680
C=O	amide carbonyl, carboxyl ester	1640–1690 1670–1740 1710–1750
C≡N	nitrile	2200–2250
C–H	alkane	2850–2950
N–H	amine, amide	3300–3500
O–H	carboxyl hydroxy	2500–3000 3200–3650

Propan-2-ol is made by hydration of propene. A sample of the product is obtained.

Which feature of the infrared spectrum of the product would show that **no** propene remains in the product?

- A** absorption in the 2900 cm^{-1} region
- B** strong absorption below 1000 cm^{-1}
- C** the lack of absorption at or near 1250 cm^{-1}
- D** the lack of absorption at or near 1550 cm^{-1}

Important values, constants and standards

molar gas constant	$R = 8.31\text{ J K}^{-1}\text{ mol}^{-1}$
Faraday constant	$F = 9.65 \times 10^4\text{ C mol}^{-1}$
Avogadro constant	$L = 6.02 \times 10^{23}\text{ mol}^{-1}$
electronic charge	$e = -1.60 \times 10^{-19}\text{ C}$
molar volume of gas	$V_m = 22.4\text{ dm}^3\text{ mol}^{-1}$ at s.t.p. (101 kPa and 273 K) $V_m = 24.0\text{ dm}^3\text{ mol}^{-1}$ at room conditions
ionic product of water	$K_w = 1.00 \times 10^{-14}\text{ mol}^2\text{ dm}^{-6}$ (at 298 K (25 °C))
specific heat capacity of water	$c = 4.18\text{ kJ kg}^{-1}\text{ K}^{-1}$ ($4.18\text{ J g}^{-1}\text{ K}^{-1}$)

