HL Paper 1

Which technique is used to determine the bond lengths and bond angles of a molecule?

A. X-ray crystallography

B. Infrared (IR) spectroscopy

C. Mass spectroscopy

D. ^{1}H NMR spectroscopy

Markscheme

A

Examiners report

[N/A]

A student heated a solid in a crucible. The student measured the mass of the solid and crucible before and after heating and recorded the results.

$$\begin{aligned}\text{Mass of crucible and solid before heating} &= 101.692\ \text{g}\\ \text{Mass of crucible and solid after heating} &= 89.312\ \text{g}\end{aligned}$$

What value should the student record for the mass lost in grams?

A. 12.4

B. 12.38

C. 12.380

D. 12.3800

Markscheme

C

Examiners report

[N/A]

The molar mass of a gas, determined experimentally, is 32 g mol^{-1}. Its literature molar mass is 40 g mol^{-1}.

What is the percentage error?

A. 80%

B. 25%

C. 20%

D. 8%

Markscheme

C

Examiners report

[N/A]

A measuring cylinder was used to obtain a known volume of a liquid. The volume was read from the top of the meniscus and the liquid completely emptied into a flask. The exact same process was then repeated. Which statement is correct about the overall described procedure and the volumes measured?

A. There is a systematic error and the volumes measured are accurate.
B. There is a random error and the volumes measured are accurate.
C. There is a random error and the volumes measured are inaccurate.
D. There is a systematic error and the volumes measured are inaccurate.

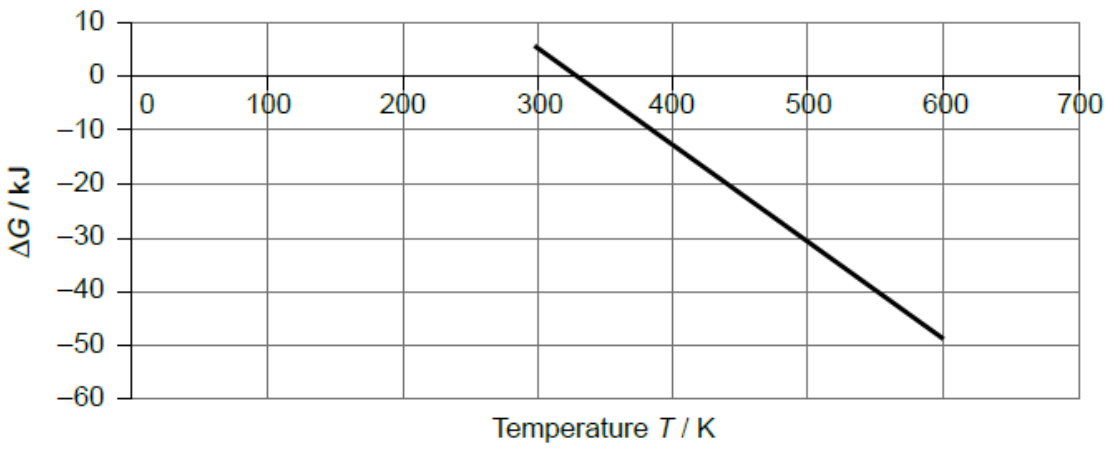
Markscheme

D

Examiners report

[N/A]

The graph shows values of Δ*G* for a reaction at different temperatures.



Which statement is correct?

A. The standard entropy change of the reaction is negative.

B. The standard enthalpy change of the reaction is positive.

C. At higher temperatures, the reaction becomes less spontaneous.

D. The standard enthalpy change of the reaction is negative.

Markscheme

B

Examiners report

[N/A]

A student measured the mass and volume of a piece of silver and recorded the following values.

Mass of empty weighing bottle	1.0800 g
Mass of weighing bottle with piece of silver	11.5700 g
Volume of silver	$1.00\,\mathrm{cm}^3$

Which value, in $\mathrm{g\,cm^{-3}}$, for the density of silver should the student report in her laboratory notebook?

A. 10.49

B. 10.4900

C. 10.5

D. 10.500

Markscheme

C

Examiners report

[N/A]
