

Hydrodesulfurization - Answer Sheet

7% of total							
Question	5.1	5.2	5.3	5.4	5.5	5.6	Total
Points	2.5	3	3.5	5	8	12.5	34.5
Score							

5.1 (2.5 pt)

Draw the structure of products **A** to **E** of thiophene hydrodesulfurization, knowing that **A** and **B** are cyclic regioisomers and **C** is cyclic.

A	B	C	D	E

5.2 (3 pt)

Considering only the isotopes listed in the question sheet, **list** all isotopologues of H₂S.

Theory



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A5-2

English (Official)

5.3 (3.5 pt)

Considering only the isotopes listed the question sheet, **list** all isotopologue of H_2S containing simultaneously D and ^{34}S nuclei and for each **calculate** the respective relative molar abundance in %.

_____ %

_____ %

5.4 (5 pt)

Calculate the number of exchanged sulfur atoms $n(S)_{\text{surface}}$, give your answer in mol.

$n(S)_{\text{surface}} =$ _____ mol

Theory



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5.5 (8 pt)

Calculate the particle radius R of the MoS_2 particles, give your answer in nm.

5.5 (cont.)

$R =$ _____ nm

Theory



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A5-4

English (Official)

5.6 (12.5 pt)

Using $R = 35.0$ nm as the radius and the data of the exchange experiment described on the question sheet, **calculate** the diffusion coefficient D for the diffusion of sulfur atoms in MoS_2 , give your answer in $\text{m}^2 \text{s}^{-1}$. In your calculations, use the following approximation: $e^x \approx 1 + x$ for $x \ll 1$.

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$D =$ _____ $\text{m}^2 \cdot \text{s}^{-1}$