

## History of up-date

[version 2.5 to final version at 12<sup>th</sup> July, 2021]

### Revision

Solution for Question 1-3 in Problem 1: The calculated value of  $N_A$  was corrected to  $6.07 \times 10^{23}$ .

Typo in the equation to define 1 m in Problem 1 (above Question 2-2) was corrected.

Problem 5: For the calculation of the number of cases for Figure 1, 10 indistinguishable molecules → 10 molecules

Solution for Question 7 in Problem 5: associated with expansion → by removing the boundary wall

Explanation of bird's-eye view in Problem 6: The figure → Figure 2

Solution for Question 1-3 in Problem 14: change the numbering of the solution to that of the problem

Question 4 in Problem 31: Duplicated sentence was removed.

[version 2.4 to 2.5 at 8<sup>th</sup> June, 2021]

### Revision

Problem 4: standard entropies of formation → standard entropy changes

Solution for Question 1 in Problem 4: “92.4/60” was removed.

Solution for Question 8 in Problem 4: Figure was added, and the phrase “(see the right figure)” was inserted.

Solution for Question 9 in Problem 4: Problem 8 → question 8, and  $3.55/2.27 \rightarrow 2.27/3.55$

Question 3-2 in Problem 20:

The standard Gibbs energy change for the water-splitting reaction is  $237 \text{ kJ mol}^{-1}$ .

→ The standard Gibbs energy change for the splitting of 1 mole of water is 237 kJ.

[version 2.3 to 2.4 at 7<sup>th</sup> April, 2021]

### Correction of wording

Problem 26: Facial chirality → Planar chirality.

### Revision in Advanced Difficulty

Facial chirality → Chirality.

[version 2.2 to 2.3 at 29<sup>th</sup> March, 2021]

#### Corrections

Henderson–Hasselbalch equation in Equations was corrected.

Question 5 in Problem 12: The value of  $C_{C-A}$  was corrected ( $-106.0 \text{ mM} \rightarrow -105.0 \text{ mM}$ ).

[version 2.1 to 2.2 at 15<sup>th</sup> March, 2021]

#### Changes for the remote IChO

Date of IChO2021 in the cover page: 24<sup>th</sup> July → 25<sup>th</sup> July

Appendix part was added at the end of the the documents. Practical Tasks were moved to Appendix part, and the comment for this change was added as the Appendix to the Preface. Only theoretical subjects were left in the Advanced Difficulty. The list of Advanced Skills was moved to the Notes. Experimental techniques that do not appear in the Practical Tasks in the IChO were removed.

#### Corrections

Question 1-2 in Problem 1: The definition of  $u$  was corrected.  $N_A$  was removed from the sentence of the question.

Solution for Question 1-2 in Problem 1: The equation and the answer were corrected

Solution for Question 8 in Problem 4: The equations for the calculation of the density of graphite and diamond were corrected.

Resonance structures of benzene in Problem 8 was corrected.

Electron–delocalized structure of anthracene for Question 2 in Problem 8 was corrected.

Chemical structure of ethylammonium nitrate in Problem 9 was corrected.

Label for  $R^2\text{-CO-NHS}$  in equation S1 in Problem 9 was corrected.

Solution for Question 2 (2) in Problem 10: The equations to calculate  $[A^{2-}]_{\text{BTB}}$  and  $[\text{HA}^-]_{\text{BTB}}$  were corrected.

Problem 15: specific weight → density

Problem 19:  $\Delta H \rightarrow \Delta H^\circ$  and ' $\rightleftharpoons$ ' → ' $\rightleftharpoons$ '

Introduction for Question 8 in Problem 21: hydroxide → hydroxy

Solution for Question 2 in Problem 26: The structures of **H-3** and **H-4** were corrected.

Solution for Question 6 in Problem 28: The values of  $K$ ,  $a$ , and  $[\text{free}[6]\text{CPP}]$  were

corrected.

[version 2.0 to 2.1 at 15<sup>th</sup> February, 2021]

#### Fixation of Typos

Question 6-3 in Problem 3:  $K_B P_A \ll 1 \rightarrow K_B P_B \ll 1$

Caption of Figure 1 in Problem 6: Potetinal  $\rightarrow$  Potential

Solution for Question 13 in Problem 4:  $E_a^{hc} \rightarrow E_a^h$

Solution for Question 14 in Problem 4:  $A_{c,13\%} \exp\left(-\frac{E_a^c}{RT}\right) \rightarrow A_{c,1\%} \exp\left(-\frac{E_a^c}{RT}\right)$

#### Changes in Wording

Question 9 in Problem 5: calculate  $\rightarrow$  estimate

pipet  $\rightarrow$  pipette in Task 6.

#### Addition

Question 2 in Problem 5: Here both  $N$  and  $n^*$  are integers.

#### Aesthetic Changes

Change of indent/line-spacing in Constants, Problem 7 and Problem 14.

Minor improvement of Scheme in Problem 21.

Improvement of quality of Schemes in Problems 23 and 25.

Spacing between Figures in Problem 28.

Removal of pale shading on compounds in Tasks 4, 5 and 7.