**Score:\_\_\_\_\_/15**

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Nickel-Hydrogen Battery: WSHS: A Secondary Cell: Validation Assessment ‘21**

**Instructions to students:**

1. Answer **ALL** the questions below in the spaces provided.

2. Show full working out for your answers and for calculations express your answer to appropriate number of significant figures.

The major electrode reactions during the **discharge** process of Nickel - Hydrogen battery are listed:

**Cathode:** NiOOH(s) + H2O (l) + e- Ni(OH)2 (s) + OH- (aq)

**Anode**: H2(g) + 2 OH- (aq) 2 H2O (l) + 2e-

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| Q1. Why is it necessary to have energy storage cells such as nickel-hydrogen battery on board the International Space Station (ISS)? (1mark) |
| Q2. What is the oxidation number of nickel in: (2 marks)  (a) NiOOH  (b) Ni(OH)2 |
| Q3. Write a balanced redox equation for the **recharge** process.  (2 marks) |
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| Q4. The engineers who designed the battery decided that it would be more efficient if the KOH electrolyte has a concentration of 35.0 % mass/mass ratio.  If 80.0 mL of the solution has a mass of 88.3 g. Express your answer to correct number of significant figures.  Calculate the concentration of the electrolyte solution, in mol L-1 . (4 marks) |
| Q5. Explain how the concentration of the electrolyte changes during the recharging process. (2 marks) |
| Q6. How would the pressure inside the cell change during recharging? Explain why this occurs. (2 marks) |
| Q7. State one advantage and one disadvantage of this cell. (2 marks)  **YR 12 CHEMISTRY END OF BATTERY ASSESSMENT TASK 2021** |