

HyTrEc

Hydrogen Transport Economy
for the North Sea Region

**The Interreg IVB
North Sea Region
Programme**

*Investing in the future by working together
for a sustainable and competitive region*



European Union



The European Regional Development Fund

Unit 2 – Hydrogen Fundamentals

TEST PAPER

Name :-

Date :-

Instructions: -

- Try to answer all questions
- Read each question carefully and choose the correct answer: A,B,C or D
- Make sure you only mark one answer for each question

Unit 2 – Hydrogen Fundamentals

TEST

1) Atoms are composed of?

- A Protons, Electrons and Neutrons
- B Protons, Electrons and Nucleus
- C Protons, Electrons and Isotopes
- D Protons, Electrons and Ions

(1.1)

2) Which statement is correct?

- A An element is a substance that is made entirely from one type of atom
- B An element is a substance that is made entirely from two types of atom
- C An element is a substance that is made entirely from three types of atom
- D An element is a substance that is made entirely from four types of atom

(1.1)

3) Which statement is correct?

- A A molecule is formed when one or more atoms join together chemically
- B A molecule is formed when two or more atoms join together chemically
- C A molecule is formed when three or more atoms join together chemically
- D A molecule is formed when four or more atoms join together chemically

(1.1)

4) What three gasses make up 99.964% of air?

- A Nitrogen, Oxygen and Argon
- B Nitrogen, Oxygen and Helium
- C Nitrogen, Oxygen and Hydrogen
- D Nitrogen, Oxygen and Carbon dioxide

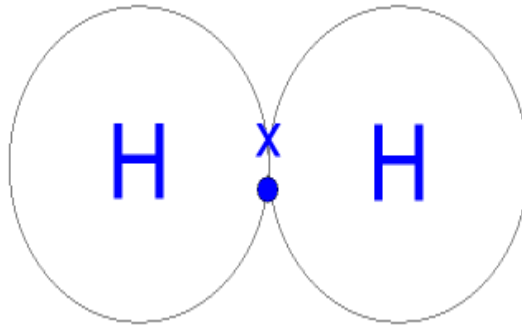
(1.1)

5) Of the nine most common gases in air, what position does hydrogen come?

- A First
- B Third
- C Ninth
- D Second

(1.1)

6) The image below shows?



- A Hydrogen atom
- B Hydrogen element
- C Hydrogen molecule
- D Hydrogen compound

(1.2)

7) Hydrogen is the first element in the periodic table meaning it has?

- A An atomic number of 1 or 1 element in each hydrogen atom
- B An atomic number of 1 or 1 neutron in each hydrogen atom
- C An atomic number of 1 or 1 electron in each hydrogen atom
- D An atomic number of 1 or 1 proton in each hydrogen atom

(1.2)

8) Hydrogen at room temperature and pressure is:-

- A A blue and reactive gas
- B A colourless and inflammable gas
- C A blue and odourless gas
- D A colourless and odourless gas

(2.1)

9) Hydrogen is the lightest element, yet it has the highest energy content per unit weight of all fuels, (Hydrogen's energy density is 52,000 Btu/lb) which is:-

- A 3 times greater than petroleum
- B 6 times greater than petroleum
- C 9 times greater than petroleum
- D 12 times greater than petroleum

(2.1)

10) What is Hydrogen embrittlement?

- A The process by which various metals, most importantly high-strength steel, becomes brittle and fractures following exposure to hydrogen.
- B The process by which various plastics, most importantly PTFE, becomes brittle and fractures following exposure to hydrogen
- C The process by which various metals, most importantly iron, becomes brittle and fractures following exposure to hydrogen
- D The process by which various plastics, most importantly PTFE, becomes hard and fractures following exposure to hydrogen

(2.1)

11) Define the term “ heavy hydrocarbon.”

- A A heavier hydrocarbon, is constructed with 5 to 18 carbon atoms per compound, are gaseous at ambient conditions and have increasing viscosity with molecular weight
- B A heavier hydrocarbon, is constructed with 50 to 180 hydrogen atoms per compound, are liquid at ambient conditions and have increasing viscosity with molecular weight
- C A heavier hydrocarbon, is constructed with 5 to 18 carbon atoms per compound, are liquid at ambient conditions and have increasing viscosity with molecular weight
- D A heavier hydrocarbon, is constructed with 50 to 180 carbon atoms per compound, are liquid at ambient conditions and have increasing viscosity with molecular weight

(2.2)

12) Which gas below is a “ heavy hydrocarbon ?”

- A Methane (CH_4)
- B Methanol (CH_3OH)
- C Ethanol ($\text{C}_2\text{H}_5\text{OH}$)
- D Hexadecane ($\text{C}_{16}\text{H}_{34}$)

(2.2)

13) Hydrogen has a low amount of energy by volume compared with petroleum, therefore:-

- A Storing the hydrogen on a vehicle using current technology would require a very long tank
- B Storing the hydrogen on a vehicle using current technology would require a plastic tank
- C Storing the hydrogen on a vehicle using current technology would require a very large tank
- D Storing the hydrogen on a vehicle using current technology would require a small tank

(2.2)

14) Fuel-cell vehicles are powered by hydrogen are:-

- A 2 to 3 times more efficient than a conventional ICE
- B 3 to 4 times more efficient than a conventional ICE
- C 4 to 5 times more efficient than a conventional ICE
- D 6 to 7 times more efficient than a conventional ICE

(2.2)

15) A light Fuel-cell hydrogen vehicle which has a driving range of 300 miles will require at least:-

- A 0.8kg of hydrogen
- B 8kg of hydrogen
- C 80kg of hydrogen
- D 800kg of hydrogen

(2.2)