

# COLLEGE OF Engineering & Technology



Lecturer : Prof. Dr. M. Amer , Dr. Ibrahim Hassan. Dr. M. Helmy<sup>a</sup>

Course : Eng. Chemistry

Course No. : BA118

Date : 21-1-2012

Marks: 40

Time: 09:00 – 11:00 (2 hrs)

## Final Examination Paper

### SECTION I

{25 marks}

Answer the following questions

- a- Describe and explain the *mechanism* of Galvanic corrosion: {9M}

b- State and explain the factors affecting of the following:

  - Erosion corrosion
  - Pitting corrosion.
  - Galvanic corrosion.

c- Write in-details about Inhibitors as protection technique.
- a- Discuss the effects and important of the following properties of liquid fuel : {8M}

  - Sulphur content.
  - Viscosity .
  - Flash point.

b- Compare between combustion of Carbon, Hydrogen and sulphur .

c- Deuce the combustion equation of Methane gas ( $\text{CH}_4$  ).
- a- Compare between Scale and Sludge. {8M}

b- Explain and discuss disadvantages of Scale formation in Boilers.

d- Describe and explain Ion exchange method, with illustrate flow sheet of process.

NB; atomic mass  $H=1, C=12, O=16, N=14, CV_C=33.7 \text{ \& } 10.5, CV_H=65.4, CV_S=9.1 \text{ MJ. } CV_{\text{methane}} =100\text{MJ}$

## SECTION II

{15 Marks}

Encircle The Best Choice from a,b,c and of The Following

1. Cathodic reaction of Fe-Cu galvanic cell is (in neutral)
  - a- reduction reaction
  - b-  $\text{Cu}^{++} + 2\text{e} \rightarrow \text{Cu}$
  - c-  $2\text{H}_2\text{O} + \text{O}_2 + 4\text{e} \rightarrow 4\text{OH}^-$
  - d-  $\text{Fe} \rightarrow \text{Fe}^{++} + 2\text{e}$
  
2. The high tendency corrosion of iron is due to
  - a- the activity of iron
  - b- the nature of iron ores
  - c- ability of iron to oxidize
  - d- all of the above.
  
3. Stainless steel pump for sea water when shutdown tend to
  - a- stress corrosion cracking.
  - b- intergranular corrosion.
  - c- pitting corrosion.
  - d- both a and c.
  
4. The following forms of corrosion are localized form
  - a- diferencial aeration corrosion.
  - b- stress cracking and intergranular corrosion.
  - c- intergranular corrosion and pitting corrosion.
  - d- both a and c.
  
5. Aluminum metal, is passive in atmosphere due to formation
  - a- aluminum oxide layer.
  - b- adhesive , insoluble and non porous layer.
  - c- passive layer.
  - d- all of the above.
  
6. Coating layer must be
  - a- Active or passive with environment.
  - b- inert or non- passive with environment .
  - c- inert or passive with environment .
  - d- both a and b.

7. Increase the velocity of fluid through the pipe lines, tends to
- a- increasing the chemical attack.
  - b- increasing erosion and decreasing chemical attack.
  - c- decreasing pitting corrosion.
  - d- all of the above.
8. Formation of carbon monoxide in fuel combustion is due to
- a- higher viscosity of fuel .
  - b- lower viscosity of fuel.
  - c- less amount of air during combustion process.
  - d- all of the above.
9. To arrive a good ignition and complete combustion of fuel must be
- a- low specific gravity.
  - b- contains high % of hydrogen.
  - c- enough amount of air supply.
  - d- all of the above.
10. High surface tension of fuel tends to
- a- bad ignition.
  - b- good ignition.
  - c- more cohesive force.
  - d- Both b and c.
11. 1 Kg Carbon needs the following amount of air to complete combustion
- a-  $\frac{8}{3}$  Kg.
  - b- 52.174 Kg.
  - c- 11.594 Kg.
  - d- 0.613 Kg.
12. 1 Kg fuel composed of 40 % C, 60 % H<sub>2</sub> , 8 % O<sub>2</sub> , 1 % Ash.(10% incomplete combustion). The amount of Energy equals
- a- 46.162 MJ.
  - b- 45.252 MJ.
  - c- 14.982 MJ.
  - d- non of the above.

13. pH of water outside Cation and Anion exchange resins equals

- a- less acidic.
- b- 7.
- c- less than 7.
- d- more than 7.

14. Hardness of water is due to presence of the following salts

- a- calcium and magnesium carbonate.
- b- calcium and magnesium sulphate.
- c- calcium and magnesium bicarbonate.
- d- both b and c.

15. Increasing of scale layer on the inner wall of boiler tubes tends to

- a- increasing the heat transfer and tube efficiency.
- b- increasing the steam productivity.
- c- decreasing the heat transfer and tube efficiency.
- d- non of the above.

*Good Luck*

Members of Course Examination Committee	Signature	Date
Prof. Mohamed Amer- Dr. Ibrahim Hassan		
Dr. Ibrahim Hassan		
Prof. Alss Abdel Bary		