RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, JUNE 2022

THIRD YEAR [BATCH 2019-22]

Date : 17/06/2022

INDUSTRIAL CHEMISTRY (HONOURS)

Time : 11 am – 1 pm

Paper : DSE-3

Full Marks : 50

Answer **any five** of the following questions: [5×10]

1. a) Write the role of Government, Management, employees and trade union in a hazardous industry.

   b) Describe Fire Triangle and its different components. [5+5]

2. a) What does TLV mean? What are the different categories of TLV? Explain what each category means?

   b) Explain BLEVE. [5+5]

3. a) According to the Manufacture, storage and import of hazardous chemical rules, 1989, define

   i. Toxic chemicals

   ii. Flammable chemicals

   iii. Extremely flammable liquids

   iv. Very highly flammable liquids

   v. Explosives. [2×5]

4. a) What are the LFL and UFL of a gas mixture composed of 0.8% hexane, 2.0% methane and 0.5% ethylene by volume?

   Given

Component	Volume %	LFL (Vol %)	UFL (Vol %)
Hexane	0.8	1.2	7.5
Methane	2.0	5.3	15.0
Ethylene	0.5	3.1	32.0

   b) Leakage of LPG occur during transfer from the LPG storage tank to LPG burner in a workshop. The leakage rate of LPG is 5 liters liquid LPG per min. and the leakage continues for 10 min. before stopping the leakage. The dimension of the workshop is 25 m long, 10 m width and 10 m high. Can you explain whether there is chance of unconfined vapour cloud explosion in workshop shed by presence of spark.

   Given

   1 L liquid LPG = 250 L of gaseous LPG at NTP

   LEL = 2%; UEL = 10% LPG (by volume) [5+5]

5. The catastropic failure of propane storage of a design capacity of 300 tonnes could give rise to the ejection of 40 tonnes of vapour which might, if ignited, in some circumstances give rise to a 40 tonne fire ball. For such fire ball calculate radius, duration, power, surface temperature of the fire ball .

   Given, For propane ΔH_c = - 4.8 X 10^{10} J/t. [10]

6. a) How toxicants enter into the biological organisms?
   b) What are the effects of toxic substances in human being?
   c) Define dose threshold and lethal dose. [3+4+3]

7. a) What is MSDS?
   b) What is the purpose of MSDS?
   c) Describe MSDS content in detail. [2+2+6]

8. Define and explain
   i. Deflagration and Detonation
   ii. Confined and Unconfined explosion
   iii. Runaway reaction. [3+3+4]

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