0.751 and 0.760 ppm of Pb. Calculate the following of this set of data

(i) mean; (ii) standard deviation; (iii) the variance; (iv) relative standard deviation in ppm; (v) the coefficient of variation; (vi) the spread 6

(c) Write the rules to measure the significant figure of the calculated measurement. 3

(d) The standard deviation in measuring the diameter d of a sphere is +/- 0.02 cm. What is the standard deviation in the calculated volume V of sphere if d = 2.15 cm? 2

UNIT - V

9. (a) What is biomass energy? What is the anaerobic digestion of biomass? 2+3=5

(b) What is Biofuel? Discuss the different types of sources of biofuel. 1+3=4

(c) Write a note on (I) pyrolysis and (II) gasification of biomass. 2.5 + 2.5=5

10. (a) Why hydrogen is considered to be fuel for future generations? 3

(b) Classify the hydrogen based on production. 3

(c) Why storing and transportation of hydrogen fuel is challenging? 3

(d) Compare the volumetric and gravimetric energy density of hydrogen with gasoline. 3

(e) Describe the volumetric energy density of hydrogen at different pressures. 2

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PG ODD SEMESTER EXAMINATION, 2022

CHEMISTRY

1st Semester

Course No. : CHMSEC - 504

(Applied Chemistry)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT - I

1. (a) What is Atom Economy? 2

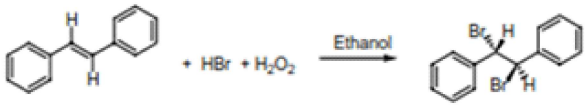
(b) What are the 12 Principles of Green Chemistry? 3

(c) Provide the 1st generation synthesis of Sitagliptin. What are the significant cons in this process? How the synthesis of Sitagliptin became greener in the 2nd generation? 4+2+3=9

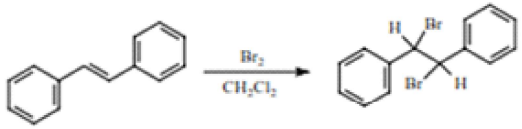
2. (a) Explain the principle of 'Design for energy efficiency' taking suitable example of two conventional reaction and their Green alternatives. 4

(b) Compare the following schemes in the light of 12 principles of Green Chemistry. Select the Greener scheme with justification, 3+2=5

Scheme 1



Scheme 2



(c) What is phase transfer catalysis? Explain with an example. Why is phase transfer catalysis considered a greener method? 3+2=5

UNIT - II

3. (a) What is catalysis? Describe two important properties (i) activity and (ii) selectivity of a catalyst. 1+4=5

(b) Write seven stages of catalytic gas reaction on a porous catalyst. Describe the Langmuir-Hinshelwood mechanism for gas phase oxidation of CO on Pt catalysts. 3+3=6

(c) Illustrate the industrial application of biocatalysts nitrile hydratase and aminoacylase. 3

4. (a) Write the advantages of rhodium catalyst $[HRh(CO)(PPh_3)_3]$ over cobalt catalyst $[Co_2(CO)_8]$ inhydroformylation reaction. 3

(b) What is homogeneous catalysis? Write the advantages and disadvantages of homogeneous catalysis. 1+3=4

(c) Describe the reaction and give mechanism of the ethylene oxidation by Wacker process using homogeneous Palladium catalyst. 5

(d) Give the electrocatalytic hydrogen evolution reactions on Pt surface in acidic medium. 2

UNIT - III

5. (a) What are antibiotics? What are different types of β-lactam antibiotics? Give example on each type. 1+2+2= 5

(b) Provide biosynthesis and mechanism of action of Penicillin G. 3+2=5

(c) Provide the structural details of the HIV virus. 4

6. (a) What is the difference between a normal cell and cancer cells? Mention the different modes of cancer treatment 2 + 2 = 4

(b) Provide the general mode of action of anti-HIV drugs. 10

UNIT - IV

7. (a) Explain the difference between 3 x 2 = 6
(i) Constant error and proportional error
(ii) Absolute error and relative error
(iii) Precision and accuracy

(b) Name three types of systematic error. What kind of the systematic errors are detected by varying sample size? 3 + 3 = 6

(c) Give the number of significant figures in each of the following measurement 4 x ½ = 2

(i) 36.7 m (ii) 0.006606 s (iii) 2.002 Kg (iv) 306,490,000 people

8. (a) Define the following terms
(i) Coefficient of variation
(ii) Gaussian Curve
(iii) Spread 3

(b) The following results were obtained in the replicate analysis of a blood sample for its lead content: 0.752, 0.756, 0.752,