

Engineering Chemistry (T2)

Marking Scheme:

Question No.		Difficulty level	Cognitive levels	Marking Scheme
Q.1)	a)	M	Comprehension	Figure – 2 marks, construction – 1 mark, working – 1 mark, calculation – 2 marks
	b)	M	Comprehension	Definition – 1 mark, determination with example – 2 marks, effect of chemical structure – 2 marks, improvement of octane number- 1 mark
	c)	M	Application	O ₂ required = 1.025 m ³ Air required = 4.881 m ³
Q.2)	a)	M	Comprehension	Definition – 1 mark, 2 preparation reactions – 2 marks, 3 merits -1 ½ marks, 3 demerits – 1 ½ marks
	b)	M	Comprehension	Manufacturing of hydrogen by steam reforming of methane – 3 marks, steam reforming of coke-3 marks. (2 reactions with conditions -2 marks, removal of CO ₂ – 1 mark)
	c)	M	Application	O ₂ required = 2.62 kg Air required = 11.39 kg
Q.3)	a)	M	Comprehension	Definition- 1 mark, Five factors- 5 marks (1 mark each)
	b)	M	Comprehension	4 points- 4 marks
	c)	M	Comprehension	Definition-1 mark, preparation-1 mark, properties-1 mark, uses-1 mark
Q.4)	a)	M	Comprehension	6 points – 6 marks
	b)	M	Comprehension	Definition-1 mark, structure-1 mark, properties-1 mark, applications- 1 mark.
	c)	M	Comprehension	4 points- 4 marks

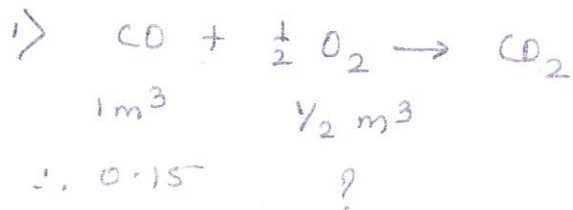
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Q. 1) c) For 1 m^3 gas,

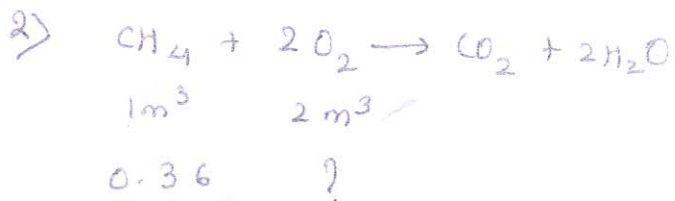
$$\text{CO} = 0.15$$

$$\text{CH}_4 = 0.36$$

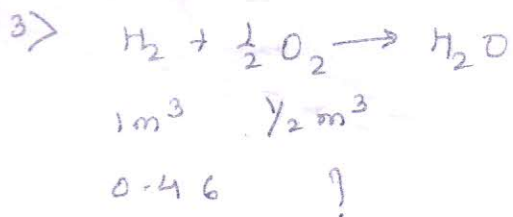
$$\text{H}_2 = 0.46$$

 O_2 required -

$$0.15 \times \frac{1}{2} = 0.075$$



$$0.36 \times 2 = 0.72$$



$$0.46 \times 0.5 = 0.23$$

$$\text{Total O}_2 = 1.025$$

$$\text{Air required} = 1.025 \times \frac{100}{21}$$

$$= \cancel{4.456} \quad 4.88 \text{ m}^3$$

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2.2) c) For 1 kg of fuel,

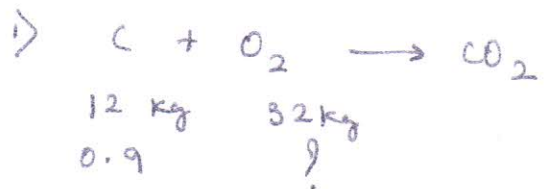
$$C = 0.9$$

$$H = 0.03$$

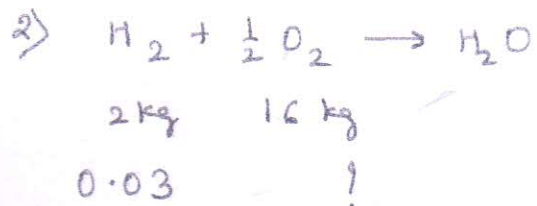
$$O = 0.025$$

$$S = 0.005 \text{ g}$$

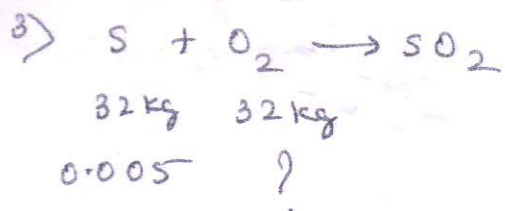
O_2 requirement -



$$0.9 \times \frac{32}{12} = 2.4$$



$$0.03 \times \frac{16}{2} = 0.24$$



$$0.005 \times \frac{32}{32} = 0.005$$

$$\text{Total } O_2 = 2.645 \text{ kg}$$

$$\text{Actual } O_2 = 2.645 - 0.025 = 2.62$$

$$\text{Air required} = 2.62 \times \frac{100}{23}$$

$$= 11.39 \text{ kg}$$