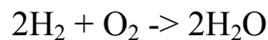# 銘傳大學八十九學年度管理科學研究所碩士班招生考試
（甲組）第一節

普通物理學 試題

(可使用計算機)

1. Suppose that 1 mol of (diatomic) oxygen interacts with 2 mol of (diatomic) hydrogen to produce 2 mol of water vapor, according to the reaction
$$2H_2 + O_2 \rightarrow 2H_2O$$
The energy Q released is 4.85×10^5 J. What fraction of the mass of the initial reactants vanishes to generate this energy?

2. The U-tube in Feg.1 contains water of density p_w in the right arm and oil of unknown density p_x in the left. Measurement gives $l = 135$ mm and $d = 12.3$ mm. What is the density of the oil?
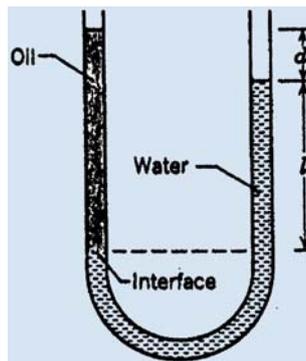

Fig. 1

3. A long straight wire of radius R =1.5 mm carries a steady current i_0 of 32A. (a) What is the magnetic field a the wire? (b) What is the magnetic field at r = 1.2 mm? (c) Plot the magnetic field, both inside and outside the wire.

4. X rays of wavelength 22 pm (photon energy = 56 keV) are scattered from a carbon target, the scattered radiation being viewed at 850 to the incident beam. (a) What is the Compton shift? (b) What percentage of its initial energy does an incident x-ray photon loose?

5. A police car, parked by the roadside sounds its siren, which has a frequency υ of 1000 Hz.
   (a) What frequency υ' do you hear if you are driving directly toward the police car at 33 m/s?
   (b) If you are driving away from the police car at this same speed, what

frequency will you now hear?

(c) Suppose that you are at rest and the police car is coming toward you at 33 m/s. What frequency do now hear?

(d) Suppose that the police car is going away from you at this same speed. What frequency do you hear?

(e) Finally, suppose that both you and the police car are driving away from each other at 33 m/s. What frequency would you hear?

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