

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. A storage tank with the following component obeys the Raoult's law.

50 L benzene (MW=78.1), vapor pressure = 10932 Pa, $\rho = 0.879 \text{ g/cm}^3$

25 L carbon tetrachloride (MW = 154), vapor pressure = 12132 Pa, $\rho = 1.595 \text{ g/cm}^3$

25 L trichloroethylene (MW = 131.5), vapor pressure = 7733 Pa, $\rho = 1.455 \text{ g/cm}^3$

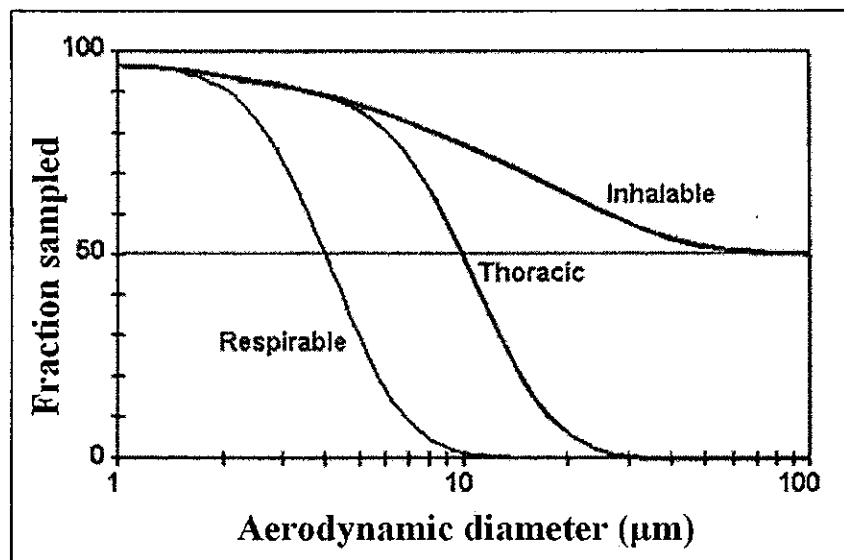
When the air at 101325 Pa is saturated with vapor of the above mixture, what is the benzene's vapor pressure in Pascal? (10%) If a worker moves his head directly to the top of the tank, what is the concentration of benzene concentration (in ppm) the worker is exposed to? (5%)

2. Please list three factors to consider for making a respirator selection. (6%) What kind of respirator would you recommend for worker exposed to 0.2 fiber/cc of Asbestos (N95 or N100)? What is your reason? (Asbestos PEL 0.15 fiber/cc). (5%) What are the possible adverse health effects of Asbestos? (4%)

3. Please discuss the new chemical substances registration under the Occupational Safety and Health Act which came into force on 1/1/2015. (5%)

4. How do we determine the maximum permissible time for worker's vibration? (9%) What are two possible health effects from vibration? (6%)

5. According to the figure below, what is aerodynamic diameter? (5%) What is the 50% cutoff point for respirable and thoracic aerosol? (10%)



Baron (1998)

6. There are two separate noise sources of 92 dBA and 99 dBA that are both operating, what is the combined noise level? (10%)
7. Please describe the evaluating tools for ergonomics? (10%)
8. In the duct below, the fan moves the air from left to right, we use a U-tube manometer to measure static pressure at point A and B, which has a larger static pressure? (3%) What is the reason? (6%) How can we and should we reduce the pressure difference between point A and B in industrial ventilation? (6%)

