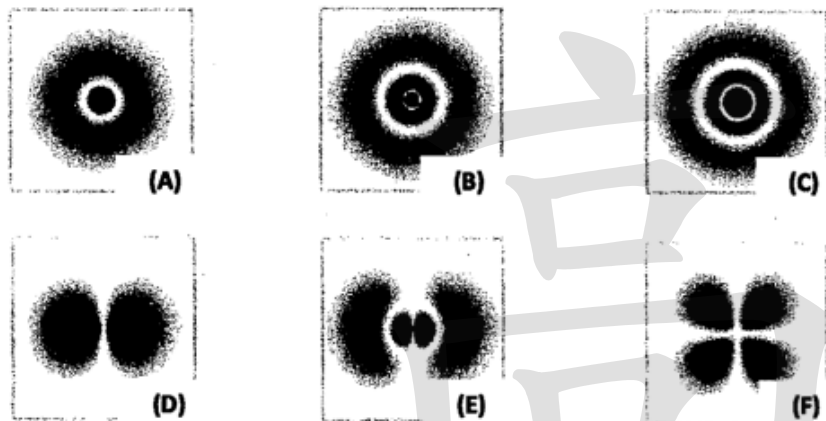


## 國立臺灣大學109學年度轉學生招生考試試題

1. 109 年台大普化 A

(5) Given the following probability density of selected atomic orbitals of hydrogen atom. Which set of orbitals have the same principal quantum number?

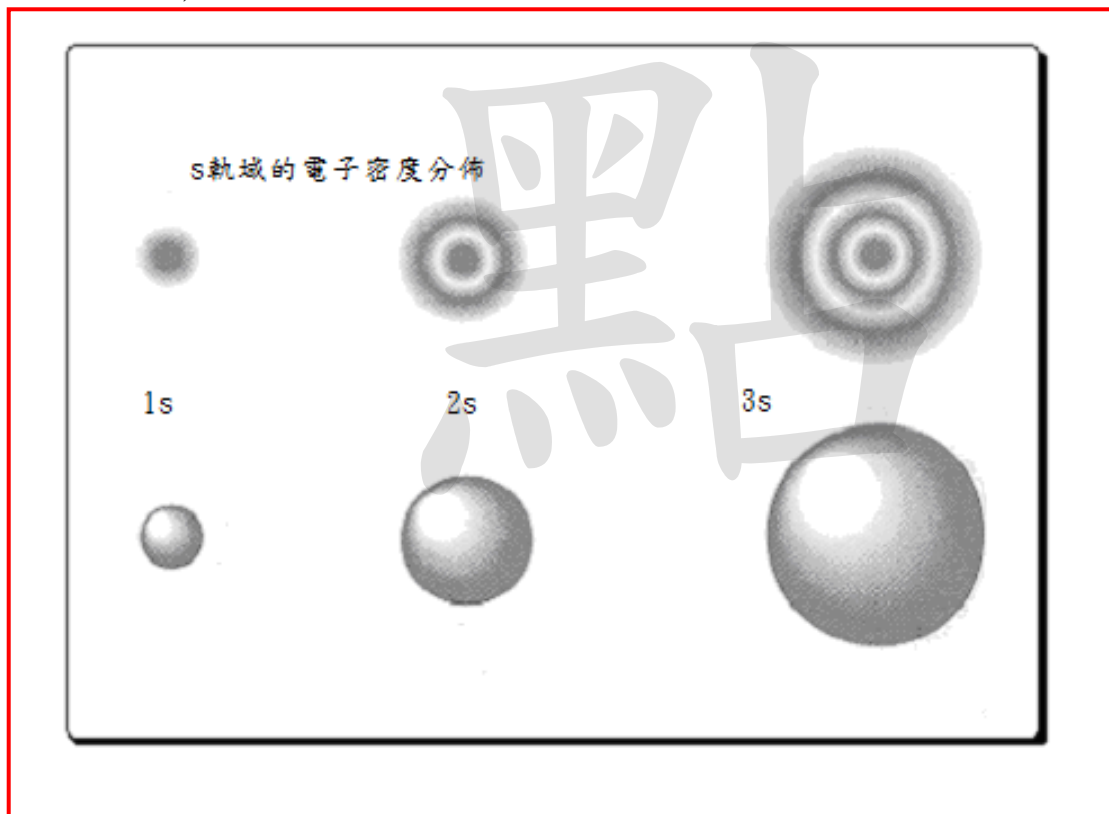


- a. A, B, C
- b. A, D
- c. B, E, F
- d. C, F
- e. D, E

ANS: b, d

(A) = 2s, (B) = 2s, (C) = 3s, (D) = 2p, (E) = 3p, (F) = 3d

A = B = D; C = E = F



(徑函數的代表的意義是原子軌域內的電子分佈情況)

普化講義第二冊, p31

2. 109 台大普化 A

(9) Assume that there are only two isotopes of copper,  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$ , and the atomic weight of copper is 63.55 g/mol, which of the following statement is/are correct?

- a.  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$  have the same number of protons and electrons
- b.  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$  have totally different chemical reactions
- c. The % abundance of  $^{63}\text{Cu}$  is 72.5 %
- d. The % abundance of  $^{65}\text{Cu}$  is 23.5%
- e. None of the above

ANS: a, c

$$63.55 = 63x + 65(1-x) = 65 - 2x, x = 0.725$$

$^{63}\text{Cu}$  佔 72.5 % ;  $^{65}\text{Cu}$  佔 27.5%

4. Naturally occurring copper exists in two isotopic forms:  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$ . The atomic mass of copper is 63.55 amu. What is the approximate natural abundance of  $^{63}\text{Cu}$ ?

(A) 70 % (B) 63 % (C) 90 % (D) 50 % (E) 30 %

【106 後西】

ANS: (A)

$$63.55 = 65x + 63(1-x) = 2x + 63, x = 0.275 \rightarrow 27.5\% \sim 30\% \text{ } ^{65}\text{Cu}; \underline{70\% \text{ } ^{63}\text{Cu}}$$

普化講義第一回, p.158

3. 109 台大普化 A (陸生)

第 8 題 The  $K_f$  for the complex ion  $\text{Ag}(\text{NH}_3)_2^+$  is  $1.7 \times 10^7$ , and  $K_{sp}$  for  $\text{AgI}$  is  $1.5 \times 10^{-16}$ . What is the molar solubility of  $\text{AgI}$  in a solution that is 2.0 M in  $\text{NH}_3$ ?

(A)  $1.5 \times 10^{-9}$  (B)  $1.3 \times 10^{-3}$  (C)  $1.0 \times 10^{-4}$  (D)  $5.8 \times 10^{-12}$  (E)  $8.4 \times 10^{-5}$

ANS: (E)



2 - 2x          x          x          at equilibrium

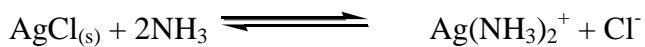
$$2.55 \times 10^{-9} = K = x^2 / (2 - 2x)^2, 5.0497 \times 10^{-5} = x / (2 - 2x)$$

$$10 \times 10^{-5} - (10 \times 10^{-5})x = x, x \sim 9 \times 10^{-5} \text{ M}$$

【精選範例】

在 0.10 M NH<sub>3</sub> 中 AgCl 溶解度為若干？

ANS:



$$0.10 - 2x \qquad \qquad x \qquad \qquad x$$

$$K = \frac{[\text{Ag}(\text{NH}_3)_2^+][\text{Cl}^-]}{[\text{NH}_3]^2} = \frac{[\text{Ag}^+][\text{Cl}^-]}{[\text{Ag}^+][\text{NH}_3]^2} \times \frac{[\text{Ag}(\text{NH}_3)_2^+]}{[\text{Ag}^+]}$$

$$(1.7 \times 10^{-10})(6.0 \times 10^{-8})^{-1} = 2.8 \times 10^{-3}$$

$$\frac{x^2}{(0.10 - 2x)^2} = 2.8 \times 10^{-3} \rightarrow x/(0.10 - 2x) = 5.29 \times 10^{-2}$$

$$(5.29 \times 10^{-3}) - (1.06 \times 10^{-1})x = x$$

$$x = 4.8 \times 10^{-3} \text{ M}$$

普化講義第五冊, p.90

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