Test 2.

一、1. D

2. D B ✓

3. C B ✓

4. A

5. C A（可逆过程）✓

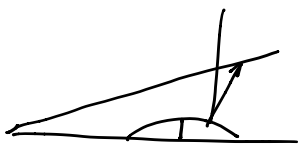
6. ? D ✗ 光轴是什么？

7. C

8. B

9. D

10. C.



二、1. $\nu C_{p,m}(V_b - V_a) = 5P_a^2$

$\frac{1}{2}\pi P_a^2$

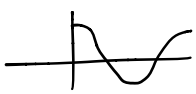
$Q = \Delta E + A$.

2. AB AD

3. ~~熵增大~~ 分子热运动无序性增大的方向

不可逆的

$u = \frac{\lambda}{T} \Rightarrow T = \frac{0.8}{100} = 8\times10^{-3}\ s$



4. 0.8 0.2 125 Hz

△多普勒效应

ν_R 接收

V_S 波源

$\nu_R = \frac{u + V_R}{u - V_S}\nu_S$

$\nu_R = \frac{u - V_R}{u + V_S}\nu_S$

5. $A\cos(\sqrt{\frac{k}{m}}t - \frac{\pi}{2})$

6. ~ 1074 Hz , 926 Hz

$\frac{340 + 34}{340 - 234} 1000$

7. 4 明 3 （自然光过P_1减半）✱ ✓

8. ~~$\frac{3}{8}L_0$~~ $\frac{3}{32}L_0$? ✓

90 km/h 234m/s

$= \frac{3.6}{\frac{90}{234}}$

$\frac{3\lambda}{a}$

$\frac{\lambda}{a}$

$\frac{2\lambda}{a}$ 任意

9. ? 1.45 V 7.14×10^5 m/s

10. 模（概率密度）

$\Psi(\vec{r}, t)$?

光电效应

$a' \cdot \frac{2\lambda}{a} = \frac{a'}{a} = \frac{3}{4}$

单值，有限，连续，归一 ✓

$(\frac{1}{2})^2 \times (\frac{\sqrt{3}}{2})^2$

$\frac{3}{2}\lambda$

$\cos 60° = \frac{1}{2}$

$\cos 30° = \frac{\sqrt{3}}{2}$

三. 1. (1). $A \to B$. $W = \int_1^2 p\,dV = \frac{1}{2}(1+3)(2-1) = 200$ (J)

$\Delta E = \nu C_{V,m} \Delta T = \nu C_{V,m} \frac{1}{\nu R}(6-1)$ $\quad C_{V,m} = \frac{i}{2}R = \frac{3}{2}R$

$Q = W + \Delta E$

$B \to C$. $W = 0$ 单位?

$\Delta E = \nu C_{V,m} \frac{1}{\nu R}(6-2)$

$Q = W + \Delta E$

$C \to A$. $W = 1$

$\Delta E = \nu C_{V,m} \frac{1}{\nu R}(2-1)$

$Q = W + \Delta E$.

(2). $W = 100$J $\quad Q = Q_1 + Q_2 + Q_3 \cdots$

step1. 水 27°C → 100°C ΔS_1

step2. 气化 ΔS_2

step3. 气 100°C → 287°C ΔS_3.

$\Delta S = m\int_{T_1}^{T_2} \frac{C_p\,dT}{T} + \frac{mL}{T_2} + m\int_{T_2}^{T_3} \frac{C_p'\,dT}{T}$

(恒压)

(2) $T = 27 + 273.15$ 等压: p. 直接写 Q

$C_{p,m_水} = 4187 \times 20$

$C_{p,m_气} = 1670 \times 20$

$\Delta S = \int_1^2 \frac{dQ}{T} = \int_1^2 \frac{d(\Delta E + A)}{T}$

3. $\Delta\delta = M\lambda$

$\Delta\delta = nl - l = (n-1)l \Rightarrow n = \frac{M\lambda}{l} + 1$

4. $N = 300/\text{cm}$.

(1). $\Delta x = 2f\frac{\lambda}{a} = 2 \times 600 \times 10^{-9} \times 1 \div (1 \times 10^{-5}\text{m}) = \sim$

(2). $d = \frac{1\text{ cm}}{300} \approx 0.3 \times 10^{-2}\text{ cm} = 3 \times 10^{-3}\text{ cm}$

法1

$\Delta x' = f\frac{\lambda}{d} = \sim$ $\quad N = \frac{2f\frac{\lambda}{a}}{f\frac{\lambda}{d}} = \frac{2d}{a}$ 条 6 (+1) 中央.

$k' = \frac{d}{a} = 3.3$.

法2

5. 以向上，$\Delta\delta = 20\lambda$ ✓

$= n_1 d - d$

$= (n_1 - 1) d$

$\Rightarrow d = \sim$

(2) $\delta = n_2 d_2 - n_1 d_1 = \sim = \sim \lambda_1$

$(n_2 - 1) d_2 - (n_1 - 1) d_1$ ✱

方均根速率相关　熵相关　光轴？✗

速率相关

$$\begin{cases} \bar{v} = \int v \frac{dN}{N} = \int v f(v) dv \\ \bar{v}^2 = \int v^2 \frac{dN}{N} = \int v^2 f(v) dv \end{cases}$$

$\sqrt{\bar{v}^2}$ ~

可逆 > 准静态

✱ $f(v) = \frac{dN_v}{N dv}$

$\int_0^N \frac{dN_v}{N} = \int_0^\infty f(v) dv = 1$

Test 3

$= \int v\, dN_v/N$

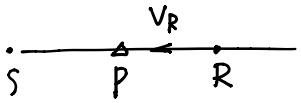
平均速率 $\bar{v} = \int_0^\infty v f(v)\, dv$

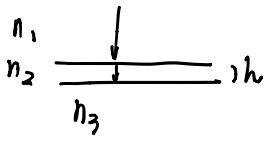
$\bar{v} = \int_{v_1}^{v_2} v f(v)\, dv$.

$pV = \nu RT$ $\quad p = nKT$

$Q > 0$ $\quad \Delta E + A$.

$w = \sqrt{\frac{k}{m}}$ $\quad kx\frac{1}{2}$?





$2hn_2 = \frac{\lambda}{2}$

$h = \frac{1}{4n_2} = \frac{\lambda}{4\times 1.38}$

5.52

一. 1. C. B ✓

2. C.

3. C. B 可逆一定是准静态 ✓

4. C. → $kx2$

5. B. A ✓

6. C.

7. D.

8. C.

9. D 辐射出射度 $M = \sigma T^4$ ↑ 周期

10. A ~~D~~ はい? ✓

$a\sin\theta = \cancel{5\lambda\sin 30°}$ $\frac{5}{2}\lambda = k\lambda$.

幅出度.

$Q = 800 = A$

$\cancel{\Delta E = \nu C_{v,m}}$

$3\times 4 = 1200J$

二. 1. ~~减小~~ ~~不变~~ ~~不变~~ 增加 ✓ 绝热膨胀

$\int_0^{v_0} \frac{a v^2}{v_0}\, dv + \int_{v_0}^{2v_0} va\, dv = 1$ $\quad \frac{a}{3}v_0^2 + \frac{3}{2}av_0^2$

$\frac{a}{v_0}\frac{1}{2}v_0^2 + av_0 = 1$ $\quad \frac{2+9}{6}v_0^2$

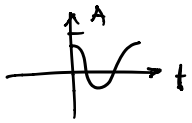
$\frac{3}{2}av_0 = 1$

$\frac{a}{v_0}\frac{1}{3}v_0^3 + \frac{1}{2}a[4v_0^2 - v_0^2] = 3v_0^2$

2. ~~$-400J$~~ $415.6J$ ✓

3. $\frac{2}{3}v_0$ $\frac{2}{3}N$ ~~$\frac{11}{6}v_0^2$~~ $\frac{11}{9}v_0$

4. ~~$-\frac{\pi}{2}$~~ ~~$-\frac{\pi}{3}$~~ $\frac{\pi}{2}$ $\frac{\pi}{3}$



$\cos(-\frac{\pi}{2})$

$\cos(\varphi) = \frac{1}{2}$

$K = \frac{d}{a}k'$

5. 最大 ~~零~~ 最大

6. $d = 4a$ $\quad 12$

7. (?)

8. $E = (n+\frac{1}{2})h\nu$ $\quad E_0 = \frac{1}{2}h\nu$.

9. 单值有限连续归一 ~~$\int_0^\infty \psi(\vec{r},t)\, dt = 1$~~

$\int_V |\psi|^2\, dV = 1$

三. 1. (1). 1→2.

$$\Delta S_1 = \int_1^2 \frac{dQ}{T} = \int_1^2 \frac{\nu C_{p,m}\Delta T}{T} = \nu C_{p,m} \ln\frac{T_2}{T_1} \qquad C_{p,m} = \frac{i}{2}R + R$$

$$\gamma = \frac{i+2}{i} = 1.4 \Rightarrow i = 5$$

2→3.

$$\Delta S_2 = \int_2^3 \frac{dQ}{T} = \int_2^3 \frac{\nu C_{v,m}\Delta T}{T} = \nu C_{v,m} \ln\frac{T_3}{T_2} \qquad C_{v,m} = \frac{i}{2}R.$$

$$\Delta S = \Delta S_1 + \Delta S_2$$

(2). 1→3.

$$pV = \nu RT$$

$$\Delta S = \int_1^3 \frac{dQ}{T} = \int_1^3 \frac{pdV}{T} = \int_1^3 \frac{\nu R}{V} dV = \nu R \ln\frac{60}{20}.$$

(3) 1→4 $\Delta S_1 = 0$

4→3 $\Delta S_2 = \Delta S$. (三次相等).

$$\Delta S_{43} = \nu C_{p,m} \ln\frac{T_3}{T_4} = \nu C_{p,m} \ln\frac{T_1}{T_4}$$

有 $TV^{\gamma-1} = C$ $p^{\gamma}T^{\gamma-1} = C$.

3. $A = 0.12\,m$. $T = 4\,s$ $\omega = \frac{2\pi}{T} = 0.5\pi$

$x = 0.12\cos(0.5\pi t)$ ✓

(1). $x|_{t=0.5} = 0.12\cos\frac{\pi}{4} = 0.06\sqrt{2}$ $F = -m\omega^2 x$ ✓

(2). $\int_0^{t_0} 0.12\cos(0.5\pi t)\,dt = -0.06 \Rightarrow t = \sim$ 用相位相也行 ✓

4. (1). $\omega = 2\pi\nu$ $y_1 = A\cos\left[2\pi\nu\left(t - \frac{x}{u}\right) - \frac{\pi}{2}\right]$ ✓ $(x \in [0, \frac{7}{4}\lambda])$ Don't forget.

(2) $y_2 = A\cos\left[2\pi\nu\left(t - \frac{\lambda}{u}\right) + \frac{\pi}{2}\right]$ ☆求反射波

(3) ? 驻波. 直接写出.

Step 1. 求 P 点振动方程.

Step 2. 加 π (相位跃变)

Step 3. 写反射波 (注意方向相反)

??

5. (1) $d\sin\theta = 2\lambda \Rightarrow d = \frac{2\lambda}{\sin\theta}$

(2) $8 = \frac{d}{a} \times 2 \Rightarrow a = \frac{d}{4}$

(3) $a\sin\frac{\lambda}{2} = a = k\lambda \Rightarrow k = \sim$ 再减去缺极.

step 1. 写 O

step 2. 写正向 y

step 3. 写 P

step 4. 写反向 y.

Test 4

一. 1. √

2. √

3. √ × (反了) √

4. √ × 概率密度 (单位体积)

5. ~ × 计算 √

二. 1. B.

2. A. 3. A √

4. C. B √

5. B.

6. D.

7. D. C √ 注意是谱线位置

8. D.

(公式) 9. C.

10. C.

11. D. B | 电子带电 1.6×10^{-19} √

12. B.

13. ( ) C

14. B / D C √

15. D.

$\Delta\theta = 2\frac{\lambda}{a}$

$\lambda = \frac{h}{p}$ $\frac{mv}{eB} = R$ $p = mv = 2eBR$ $= \sim$

$\Delta\delta = \lambda = (n-1)L$ $\Rightarrow (n_2-1)d\sin\theta = \lambda$.

$n_1 d\sin\theta \rightarrow n_2 d\sin\theta$

$= 3\lambda$ $= 4\lambda$

$n_1 = \frac{3\lambda}{dS}$ $n_2 = \frac{4\lambda}{dS}$ $\frac{n_2}{n_1} = \frac{4}{3}$ 6 4 3 2

$f\frac{\lambda}{d}$ 442 663

$3\lambda = 2n\Delta h + \frac{\lambda}{2}$

$\lambda = 2en_2 = 2\times 0.4\times10^{-} \times 1.5$

120.

$\frac{\lambda}{a}$.

0 1 2 3

$\sin\theta = \frac{1}{2}$ $\frac{3}{2}\lambda = a\sin\theta$

$\frac{d_k}{\lambda_1} = \frac{d_{k'}}{\lambda_2} \Rightarrow \frac{\lambda_1}{\lambda_2} = \frac{k'}{k_2} = \frac{442}{663} = \boxed{\frac{2}{3}}$

$2\times10^{-3}\times100 = 0.2\,cm \rightarrow a$.

$0.8cm \rightarrow b$

$\frac{d=1\times10^{-2}}{a=2\times10^{-3}} = 5$

$\delta\theta = 1.22\frac{\lambda}{D}$

$= 1.22\times\frac{550\times10^{-9}}{5\times10^{-3}m} = 1.22\times110\times10^{-6}$

$\times10^{--2}$

$1.2\overline{)0.6} = 12\overline{)60}$ $\boxed{10.5}$

1.22
11
122
122
1322.

$h\nu - A$ $h\frac{c}{\lambda} - A$

eU_c

$\frac{18}{2}$ $9-4.2$.

$E = h\nu = \frac{hc}{\lambda}(\times1.2)$ $E \div 1.2$

$\lambda = \frac{h}{p} = \frac{h}{mv}$ $\frac{h}{m_e c}\lambda_c$

$\Delta p = \frac{h}{\lambda^2}\Delta\lambda$

$\lambda = 200\times10^{-9}$

$\nu = \frac{c}{\lambda} = \frac{3\times10^8}{200\times10^{-9}} 2\times10^{7}$

$1.5\times10^{15}\times h - A$

$1.5\times10^{15}\times6.56\times10^{-34} - 4.2eV$

$\Delta\lambda = \frac{h}{\Delta p} \Rightarrow \Delta p = \frac{h}{\Delta\lambda}$

$\Delta p_x \Delta x \geq \frac{\hbar}{2}$ $\hbar = \frac{h}{2\pi}$

$\Delta\lambda = \frac{h}{\Delta p}$ $\Delta p = \frac{h}{\Delta\lambda} \approx \frac{6}{5}$ 10^{-34} Joule $\times10^{-3}$ 10^{-31}

$1.2\times10^{-} > 6$

6.56×10^{-34}

$1.2\times10^{-31}\ \Delta x \geq 6\times10^{-14}$ 5

5×10^{3}.

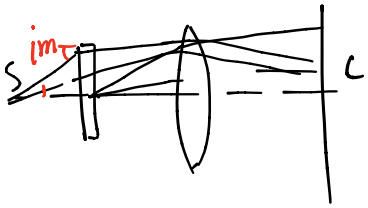
6.56
1.5
3280
656
9.840

$9.84 \div e(1.6\times10^{-19})$

≈ 6.1

三. 1. (1). 0级?

(2). B



渝.

$2n_2 e\cos\gamma = k\lambda$

$2h\sqrt{n^2-\sin^2 i}$ Δ

$k = \frac{2n_2 e}{\lambda} = 47.4$ $i_m = 45°$

✓ 2. (1). $d\sin\theta = \lambda_1 = 2\lambda_2$ $2\times 400 > 740$, 无重叠

(2) $2\lambda_1 = 3\lambda_2$ $800 \sim 1520$ 有

$1200 \sim 3\times 760$.

(3). 减即可

3. 没学

4. (1).

$E_n = \frac{\hbar^2}{2m}\cdot\frac{\pi^2}{a^2}n^2 = \frac{3kT}{2}$

$\Rightarrow n = ?$ ×

$E_n = n^2 E_1 = \frac{3}{2}kT$

$\Rightarrow n = \left(\frac{3}{2}\frac{kT}{E_1}\right)^{\frac{1}{2}} = 3$

(2). $\left.\begin{aligned} E_n &= n^2 E_1 \\ E_{n+1} &= (n+1)^2 E_1 \end{aligned}\right\} \Rightarrow \cdots$

(3). $\psi = \sqrt{\frac{2}{a}}\sin\frac{n\pi}{a}x$

(4). $P = \int_0^{\frac{1}{4}} \psi^2\, dx = \cdots$

Test 5

$\Delta x = f\frac{\lambda}{a}$

$N\lambda = 2d$

$N \times 539 = 2 \times 0.62\ mm$

$3\lambda =$

$\delta\theta = 1.22\frac{\lambda}{D} = 1.22 \times \frac{550}{3}$

$L\ \sin\theta = 2 \qquad L = \frac{2}{\theta}$

$\angle\theta = 2$

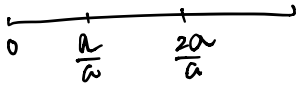
$\frac{1}{2}a = \frac{5}{2}\lambda$

一. 1. B
2. D
3. ~
4. D
5. B
6. ~
7. C
8. A
9. ~
10. C 偏出度 D
11. D
12. C.

二. 1. (1) 向下移动

(2). $S_1 \qquad 4\lambda = (n-1)d \Rightarrow d = \frac{4\lambda}{n-1}$ ✓

(3). 单: $\Delta x = 2f\frac{\lambda}{a}$



光栅: $\Delta x' = f\frac{\lambda}{d} =$ ~~0.2?~~ 0.48

$k = \frac{d}{a} = 6\ (5)\ k \qquad \pm 1\ 2\ 3\ 4\ 5\ +0.$

a = 0.08

b =

d是什么?

a+ 0.08 + 0.4
= 0.48

2. (1). $d\sin\theta = \lambda k$ (2) $\frac{1}{d} = \sim$

$d\ 0.1 = \lambda \Rightarrow d = 10\lambda$

(3). $4 = \frac{d}{a} \Rightarrow a = \frac{d}{4} = \frac{5}{2}\lambda.$

$b = d - a$

(4). 7

(5). (d) $\sin\frac{\pi}{2} = \lambda k \Rightarrow k = \frac{d}{\lambda} = 10$

缺 $\pm 4, \pm 8.$

3. ~

4. (1). $-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\psi(x) + U\psi(x) = E\psi(x)$

势阱内 $U=0$: $-\frac{\hbar^2}{2m}\frac{\partial^2\psi}{\partial x^2} = E\psi$

势阱外 $U=\infty$: $\psi = 0$

(2). $E_n = \frac{\hbar^2}{2m}\cdot n^2 \cdot \frac{\pi^2}{a^2}$ $\quad E_1 = \sim$.

(3). $\frac{\hbar^2}{2m}\cdot\frac{\pi^2}{a^2}n^2 = \frac{3}{2}kT \Rightarrow n = \sim$.

再坚持一下

晨光为你加油