KEY

CHEM 3523 001 Fall 2023 **Name:**
ID:

Final Exam

Answer Sheet: (The conceptual questions are multiple choice. List the letter that corresponds to the correct answer. For the calculation problems list under ***a) the final equation*** that gives the solution. Use only symbols, not intermediate numerical results. List under ***b) the final numerical result***. Make no mistakes when transferring the answers! Put your names on **both** answer sheets **and** the work pages, and **return all pages!** Conceptual questions are **0.5 pts** each, calculation problems **3+1 pts**. Maximum number of points you can get is **50 pts**!)

General Infos:

- No programable calculators, smartphones, smartwatches, tablets, headphones, ... are allowed. Neither any notes or books.
- Any attempt of cheating or other forms of academic dishonesty will result in an automatic "F" for the course.
- **Show a picture ID** when leaving
- Be considerate when you finish early. Consider to stay till end, or at least be quite when leaving earlier to avoid distracting your fellow students!

Conceptual questions:		Problems & Calculations:	
1)	c	1a)	$\frac{m_2}{m_1} = \frac{P_1}{P^* - P_1} \frac{m_2}{m_1}$
2)	b	1b)	0.27
3)	a	2a)	$\Delta H_{vap} = R \cdot \ln \frac{P_2}{P_1} \cdot \frac{T_1 \cdot T_2}{T_2 - T_1}$
4)	b	2b)	27.02 $\frac{kJ}{mol}$
5)	a	3a)	AH_2 is oxidized by B
6)	c	3b)	0.25 V
7)	a	4a)	$\alpha = \frac{\Lambda}{\Lambda_0}$
8)	b	4b)	0.017
9)	a	5a)	$E = \frac{h^2}{8mL^2}(1+1+1)$
10)	a	5b)	~~1.81×10^{-7} J~~ 4.52×10^{-10} m/s
11)	b	6a)	$\Delta v_x \geq \frac{\hbar}{2m\Delta x}$
12)	b	6b)	3.44×10^{-10} m/s
13)	d	7a)	$\Delta E_{j \to j+1} \geq \frac{\hbar^2}{I}(j+1)$ $\lambda \propto \mu$
14)	a	7b)	$\lambda_D = 2\lambda_H = 1000$ nm
15)	a	8a)	$\frac{1}{\lambda} = R_H\left(\frac{1}{3^2} - \frac{1}{5^2}\right)$
16)	b	8b)	434.2 nm
17)	a	9a)	$E = \left(n + \frac{1}{2}\right) h \nu_0$
18)	a	9b)	1.641×10^{-19} J
19)	a	10a)	$\omega(2,1,3) = \frac{6!}{2!1!3!}$; $\omega(1,4,1) = \frac{6!}{4!1!1!}$
20)	a	10b)	$\omega(2,1,3) = 60$
			$\omega(1,4,1) = 30 < 60$