A Formative Student Feedback and In-Class Response Tool

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Which of these best applies to you?

A. I have **never** seen clickers used before.

B. I have seen clickers, but *never used one myself*.

C. I have seen clickers and used them myself at a conference (or other venue), but <u>never used them with my students</u>.

D. I have used clickers with my students, but am eager to learn what is ***Peer Instruction*** (PI).

E. I have used clickers in the context of PI, but I am here to see if there are <u>*new ways I could be implementing PI*</u>.

Eric Mazur – Peer Instruction

Nothing clarifies ideas better than explaining them to others.

"Peer Instruction actively engages students in their own learning."

Eric Mazur

Professor Mazur uses conceptual questions to provide short breaks in his lecture, giving students an opportunity to interact with the key points of the content. This gives students an opportunity to process information – an important strategy for better cognition.

Peer Instruction…

..is..	..is not…
Interactive	Memorization
Student-centered	Lecture-based
Time-tested	Time-intensive
Low-stakes	Cost-intensive
Fun	Boring

TURNING technologies

What it looks like…

A quick look at the hardware...

and the software interface....

Turning Point Cloud Interface

Peer Instruction: Best Practices

1. Ask students question first individually...

2. Don't show bar graph (or do) but ***comment*** on results.

3. "Find someone who responded differently than you did...convince him or her that you are correct..."

4. Re-poll the same question...typical results look like this:

ΔH_{fus} and ΔS_{fus}

Channel 41
Session ID 135623

ΔH_{fus} and ΔS_{fus}

If the molar heat of fusion of a certain substance is 5000 J/mol and the entropy of fusion is 50 J/molK, then the melting temperature is

A) impossible to determine from the data.

B) 100 °C.

C) -173 °C.

D) -273 °C.

Typical Results – First time a question is asked...

Results by Question

1. Question 1 (Multiple Choice)

	Responses	
	Percent	**Count**
Answer A	7.69%	1
Answer B	30.77%	4
Answer C	53.85%	7
Answer D	7.69%	1
Totals	**100%**	**13**

8% 31% 54% 8%
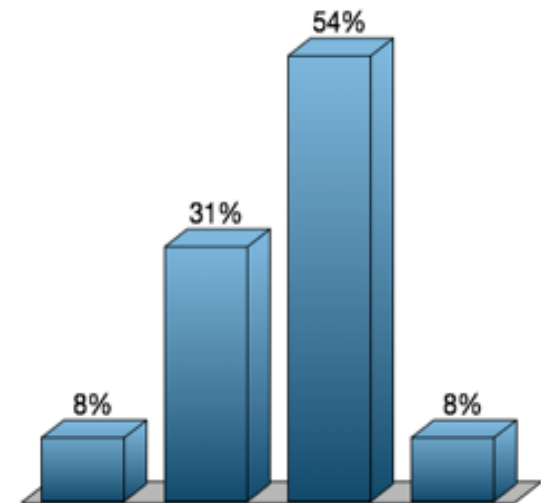
2. Question 2 (Multiple Choice)

Responses		
	Percent	Count
Answer A	0%	0
Answer B	0%	0
Answer C (c)	100%	15
Totals	100%	15

ΔH_{fus} and ΔS_{fus}

If the molar heat of fusion of a certain substance is 5000 J/mol and the entropy of fusion is 50 J/molK, then the melting temperature is

A) impossible to determine from the data.

B) 100 °C.
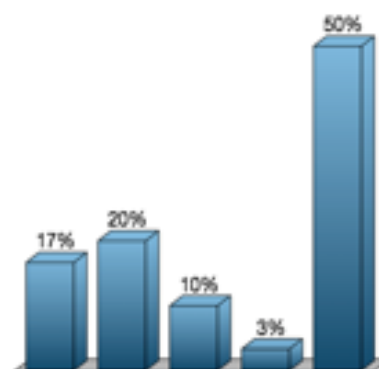
C) -173 °C.

D) -273 °C.

A Different Class

Similar results...

First poll was atop my power point, next one is over my PDF notes; the third one is again for a slide presentation. All of these are poll anywhere...

3. Question 3 (Multiple Choice)

	Responses	
	Percent	**Count**
Answer A	16.67%	5
Answer B	20%	6
Answer C	10%	3
Answer D	3.33%	1
Answer E	50%	15
Totals	**100%**	**30**

temperature increases (for most)   (think soda pop)

Solubility *rule of thumb* – "like dissolves like"
    Substances with similar IMFs tend to dissolve in each other, i.e. polar in polar (ethanol in w
non polar in non-polar (benzene in CCl_4); ionic in polar (NaCl in H_2O).

Q: Which of the following would make a good solvent for iodine, I_2?
    A) HCl   B) H_2O C) CH_3OH D) NH_3 E) CS_2

Ans:

4. Question 4 (Multiple Choice)

Responses		
	Percent	Count
Answer A	3.45%	1
Answer B	0%	0
Answer C	0%	0
Answer D	0%	0
Answer E (c)	96.55%	28
Totals	100%	29

temperature increases (for most)

(think soda pop)

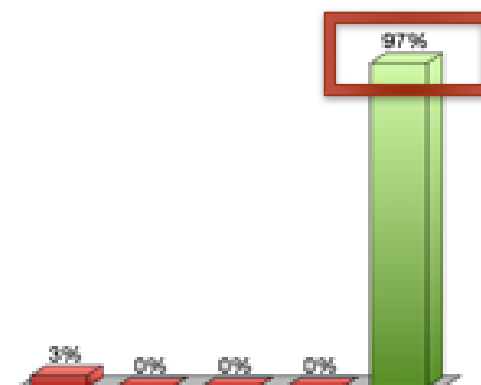Solubility *rule of thumb* – "like dissolves like"

Substances with similar IMFs tend to dissolve in each other, i.e. polar in polar (ethanol in water); non polar in non-polar (benzene in CCl_4); ionic in polar (NaCl in H_2O).
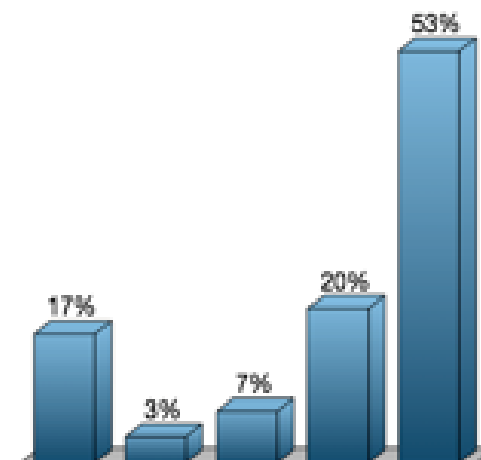
Q: Which of the following would make a good solvent for iodine, I_2?

A) HCl   B) H_2O C) CH_3OH D) NH_3 E) CS_2

Ans:

1. Question 1 (Multiple Choice)

Responses		
	Percent	Count
Answer A	16.67%	5
Answer B	3.33%	1
Answer C	6.67%	2
Answer D	20%	6
Answer E	53.33%	16
Totals	100%	30

Inter- and Intra-molecular forces

Which type of forces are characterized by VERY LOW melting points?

A) Network covalent

B) Ionic

C) Metallic

D) Polar molecular

E) Non polar molecular

2. Question 2 (Multiple Choice)

Responses		
	Percent	**Count**
Answer A	3.45%	1
Answer B	0%	0
Answer C	0%	0
Answer D	0%	0
Answer E (c)	96.55%	28
Totals	100%	29

97%

3% 0% 0% 0%

8:36 AM

0:08:23

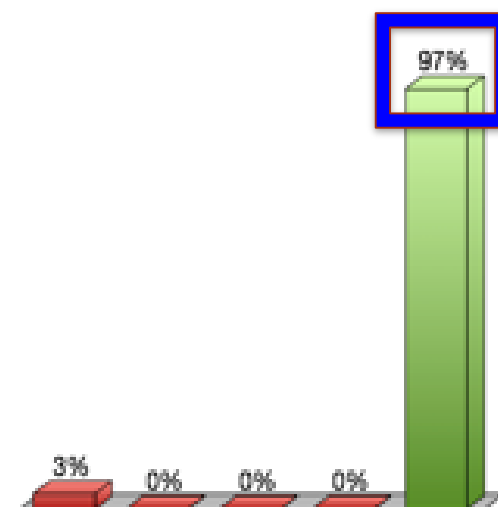Click to add meeting notes

Inter- and Intra-molecular forces

Which type of forces are characterized by VERY LOW melting points?

A) Network covalent

B) Ionic

C) Metallic

D) Polar molecular

E) Non polar molecular

Select the *BEST* Answer...

Are Clickers the only way to implement PI?

A. Clickers are the only way to implement PI.

B. There are web-based polling options, such as POLL ANYWHERE (40 or fewer students).

C. If you have a very small class, students can hold up fingers at their chest.

D. Index cards with bold-faced letters A, B, C and D can be used to poll students.

E. Options B through D are low-cost ways to implement peer instruction.

Select the *BEST* Answer…

How do I learn to use clickers?

A. Ask someone in your department who already knows how.

B. Wait until next semester when UNIT runs a training about clickers.

C. Ask Stef. Stephanie.A.Katz@Villanova.edu

D. All of the above.

Each card has a letter on one side and a number on the other.

Rule: If a card has a vowel on one side, it should have an even number on the other.

What is the smallest set of cards one must turn over to check whether this rule is being followed?

A.   A
B.   A & 6
C.   A & 7
D.   A, 6, M & 7

References

✧ Davis, B. (2009). Tools for teaching. (2nd ed.) CA: Jossey-Bass.

✧ Hillyard, C., Gillespie, D., Littig, P. (2010). University students' attitudes about learning in small groups after frequent participation. Active Learning in Higher Education. 11, 9-20.

✧ Mazur, E. (1996). Peer instruction: a user's manual. Upper Saddle River, NJ: Prentice Hall.

✧ Mazur, E. Crouch, E. H, <u>Peer Instruction: Ten Years of Experience and Results</u>, *Am. J. Phys.,* **69** (9), September 2001.

✧ Michaelsen, L., Knight, A., Fink, D. (Eds.) (2004). Team- based learning. Sterling, VA: Stylus (original work published 2002).

✧ Personal Data, Villanova University, CHM 1151 & CHM1152, Spring 2015.