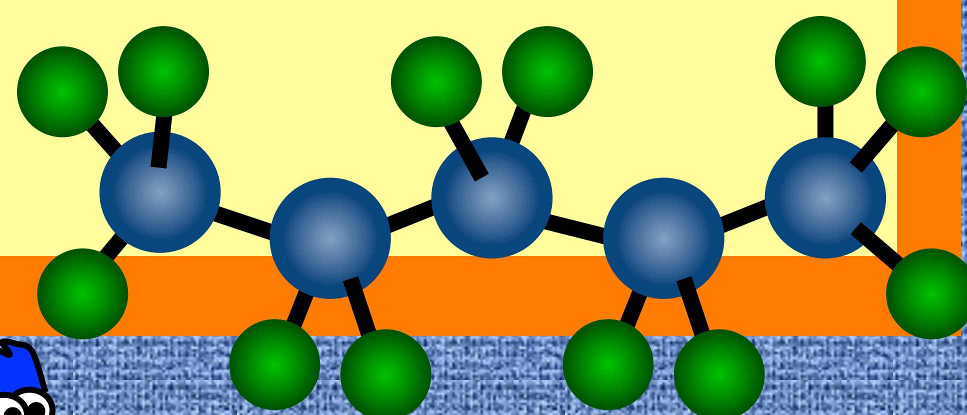
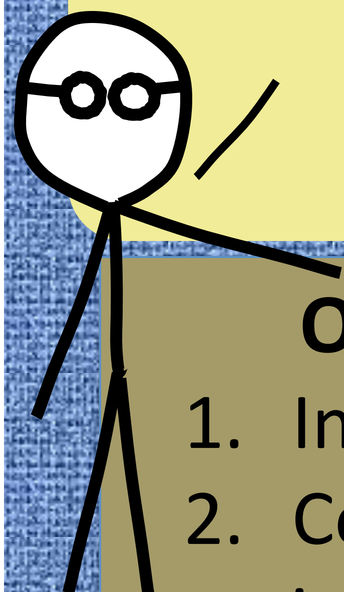
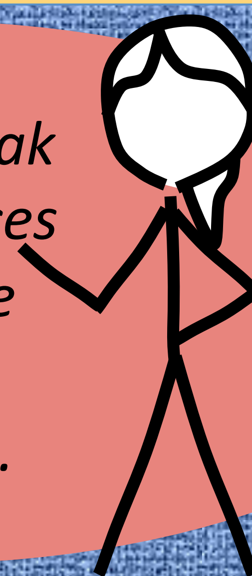
Experiment 10
9 November 2017
Intermolecular Forces



Objective: To see how intermolecular forces affect rates of evaporation.



Today we will be gathering qualitative, empirical information about intermolecular forces.



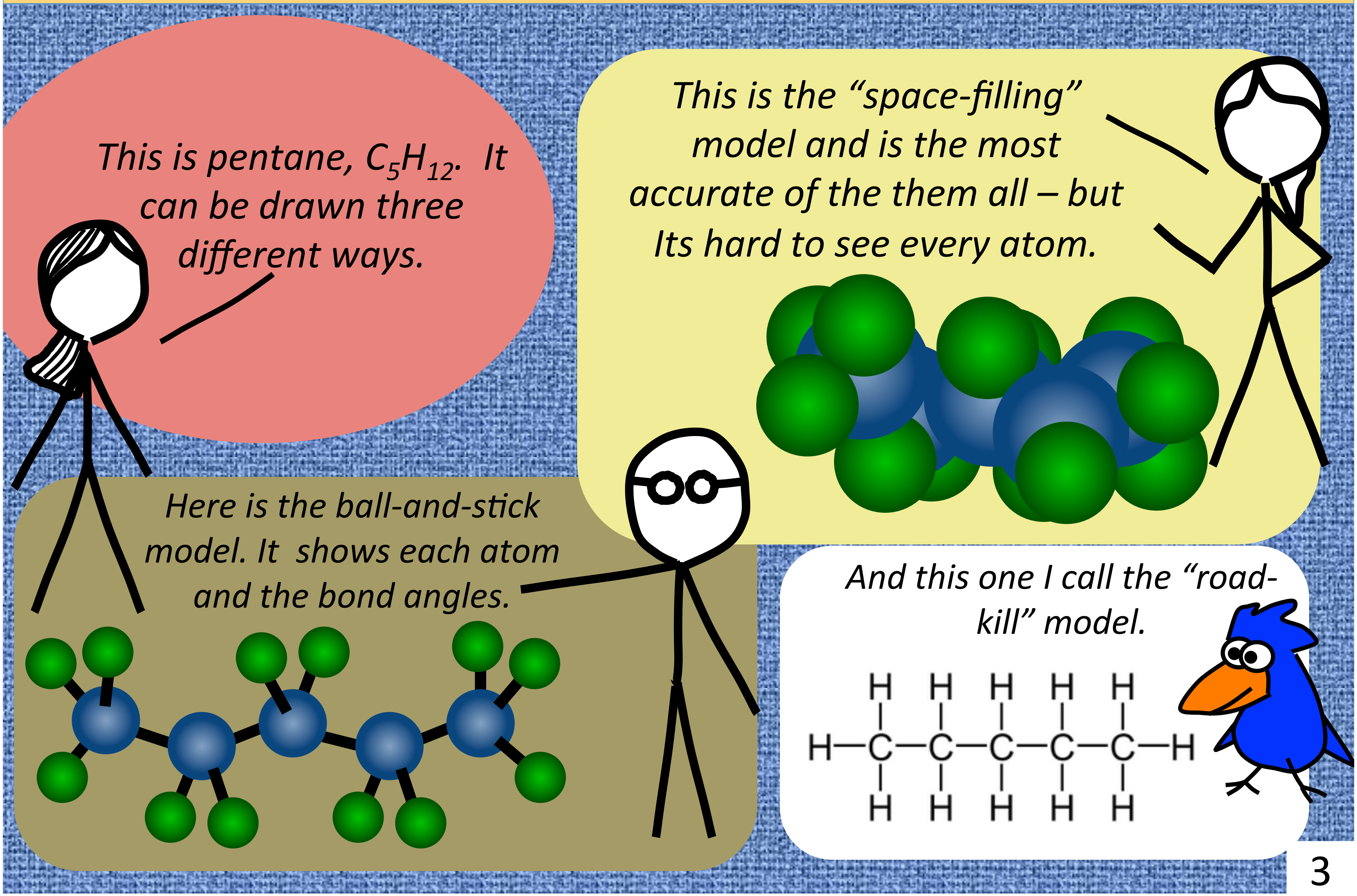
Molecules with weak intermolecular forces tend to evaporate faster…

…as we shall see.

Overview:

1. Intermolecular forces
2. Connecting rate of evaporation with intermolecular forces
3. Procedure: Using LoggerPro
4. Procedure: What to do today
5. Your lab report

1. Intermolecular forces



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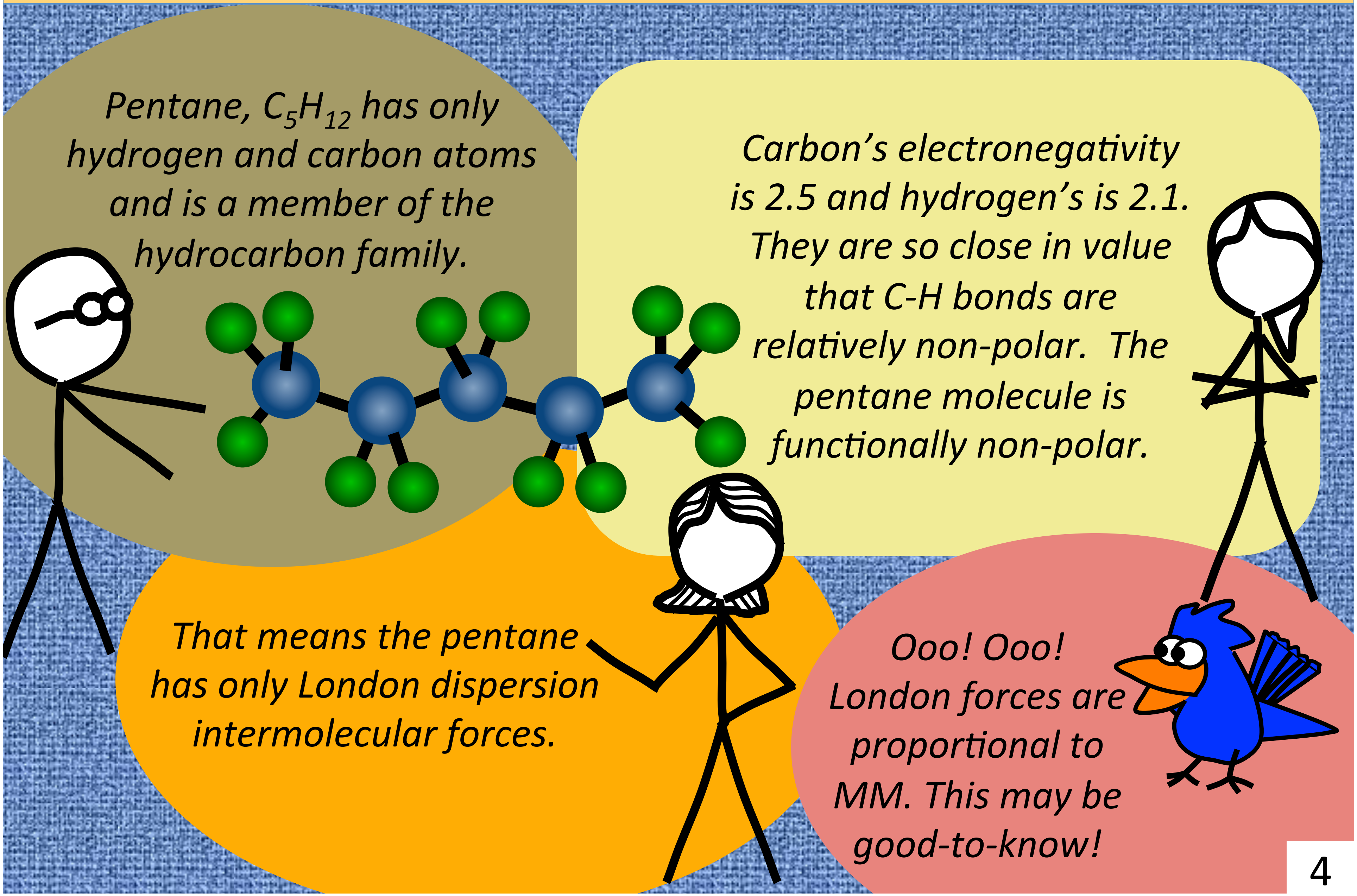

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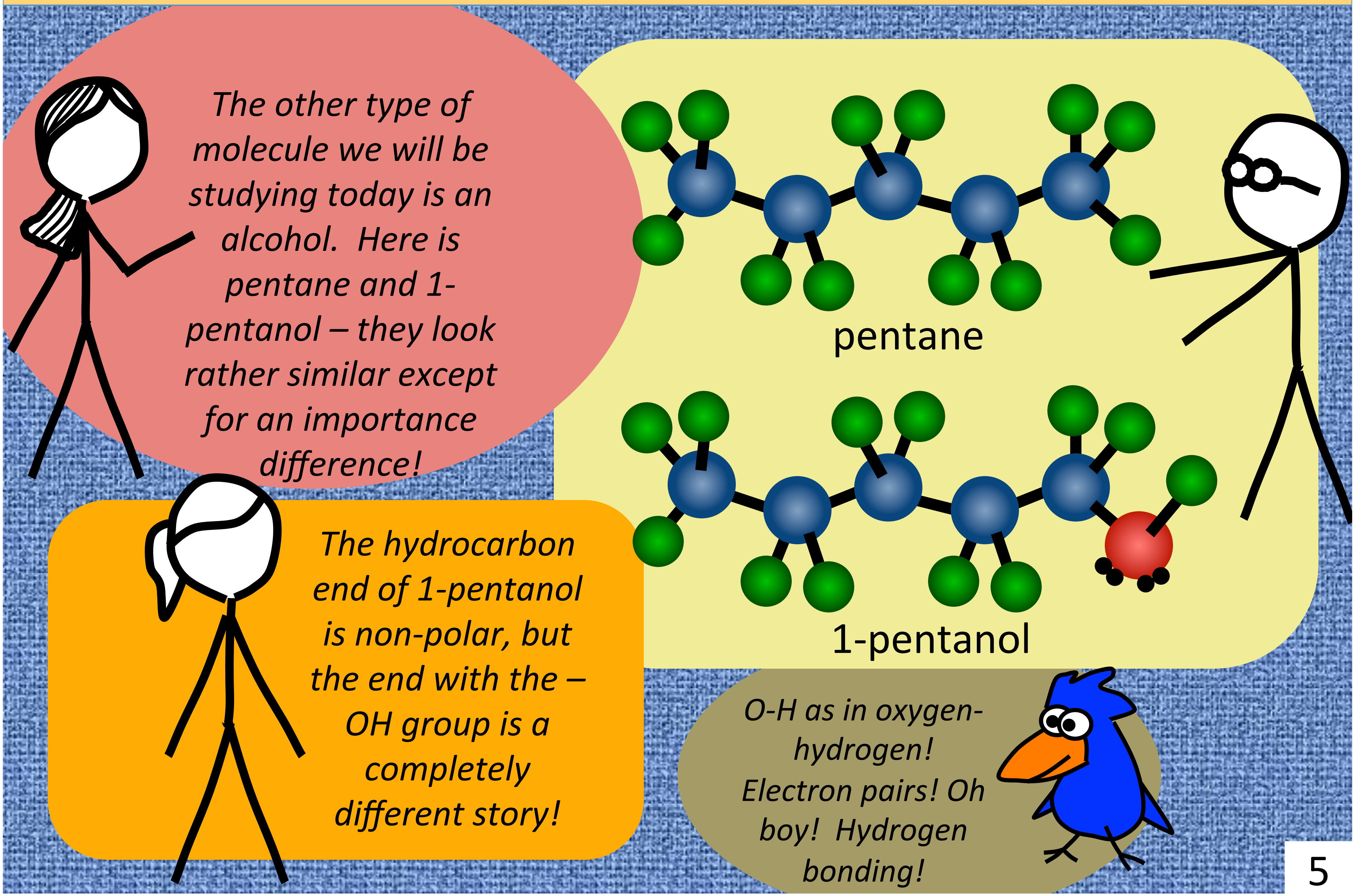
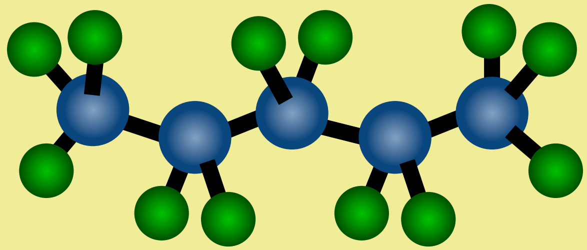
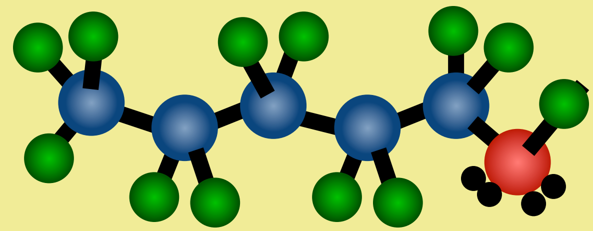


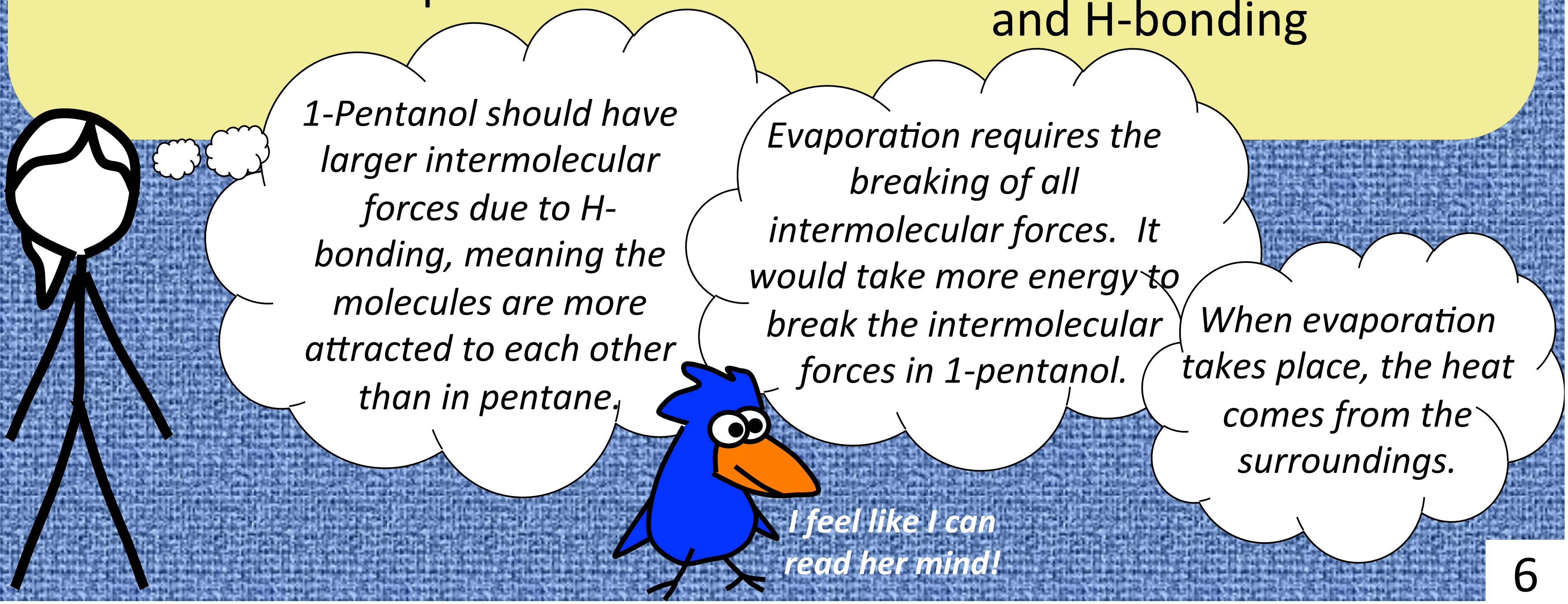
2. Connecting rate of evaporation with intermolecular forces



pentane
London dispersion forces



1-pentanol
London dispersion forces and H-bonding



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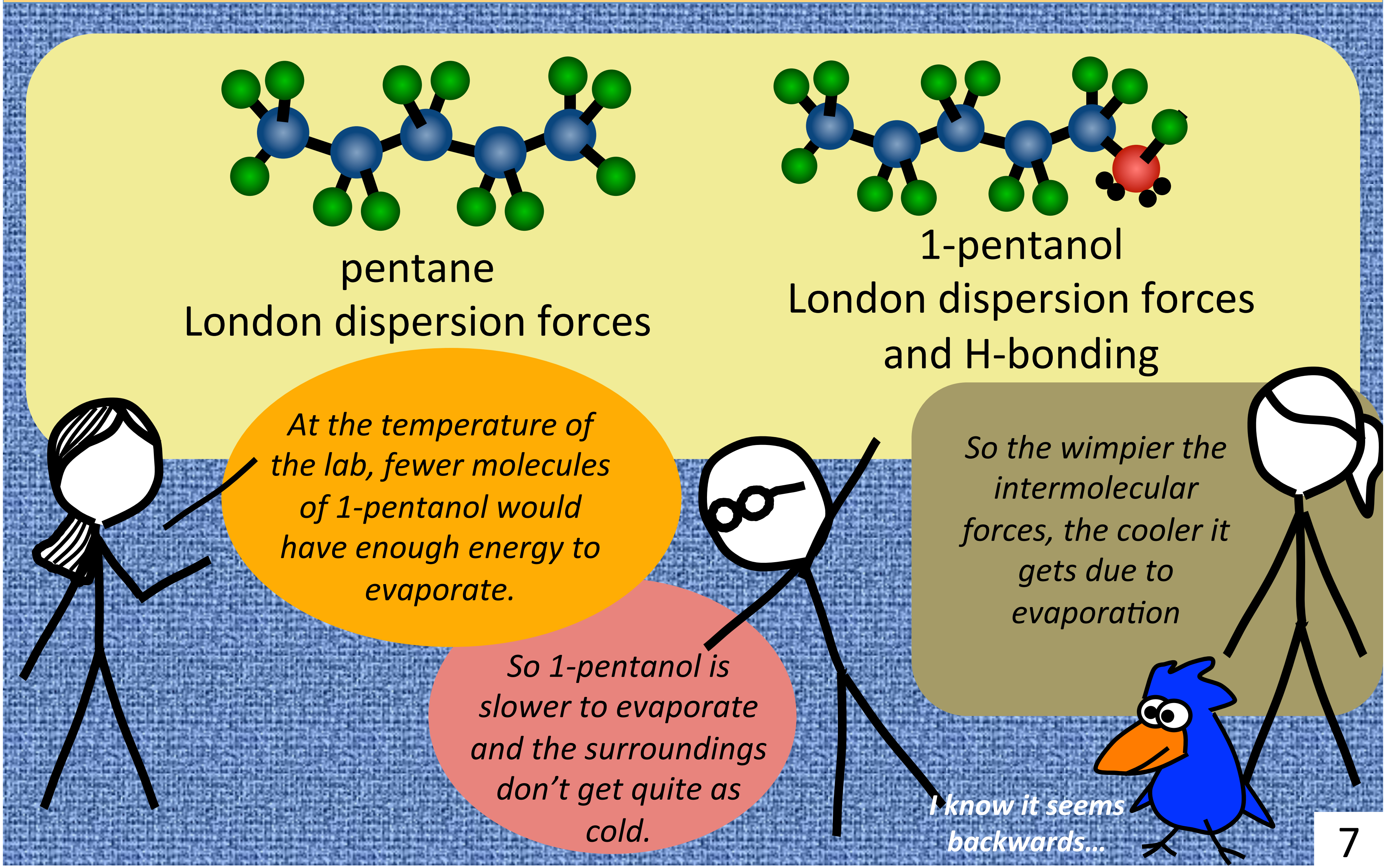

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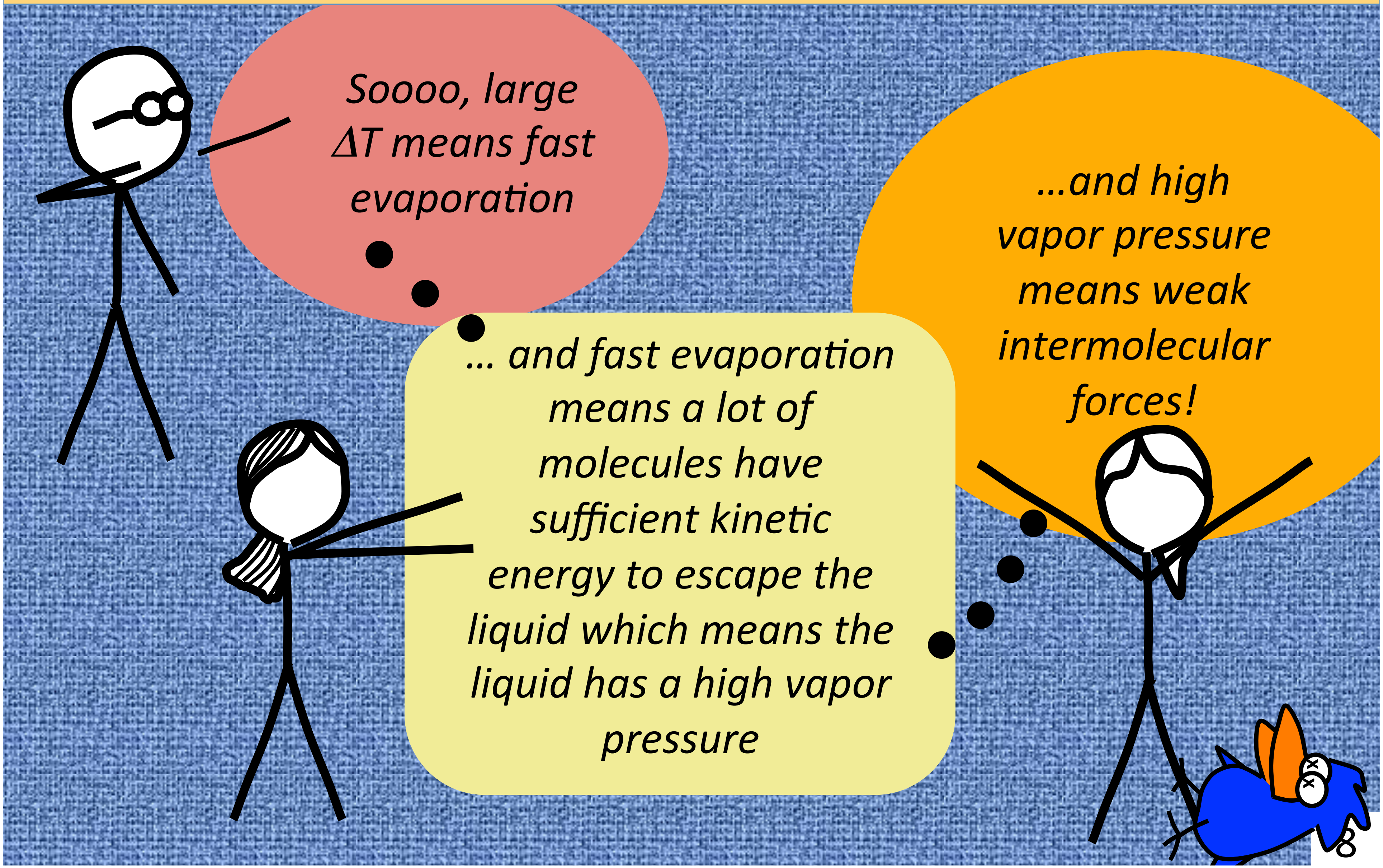
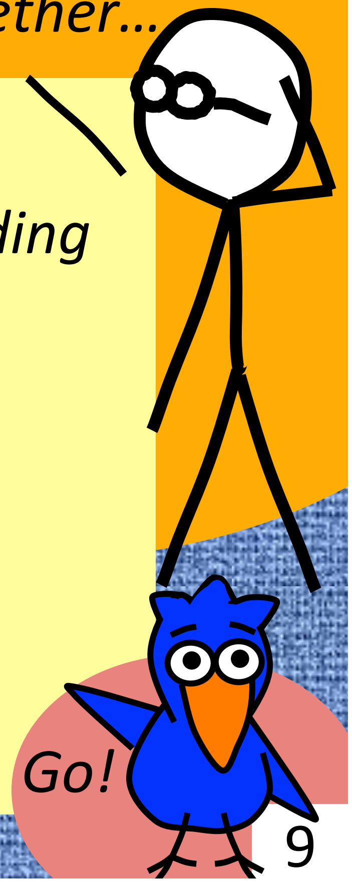


2. Connecting rate of evaporation with intermolecular forces

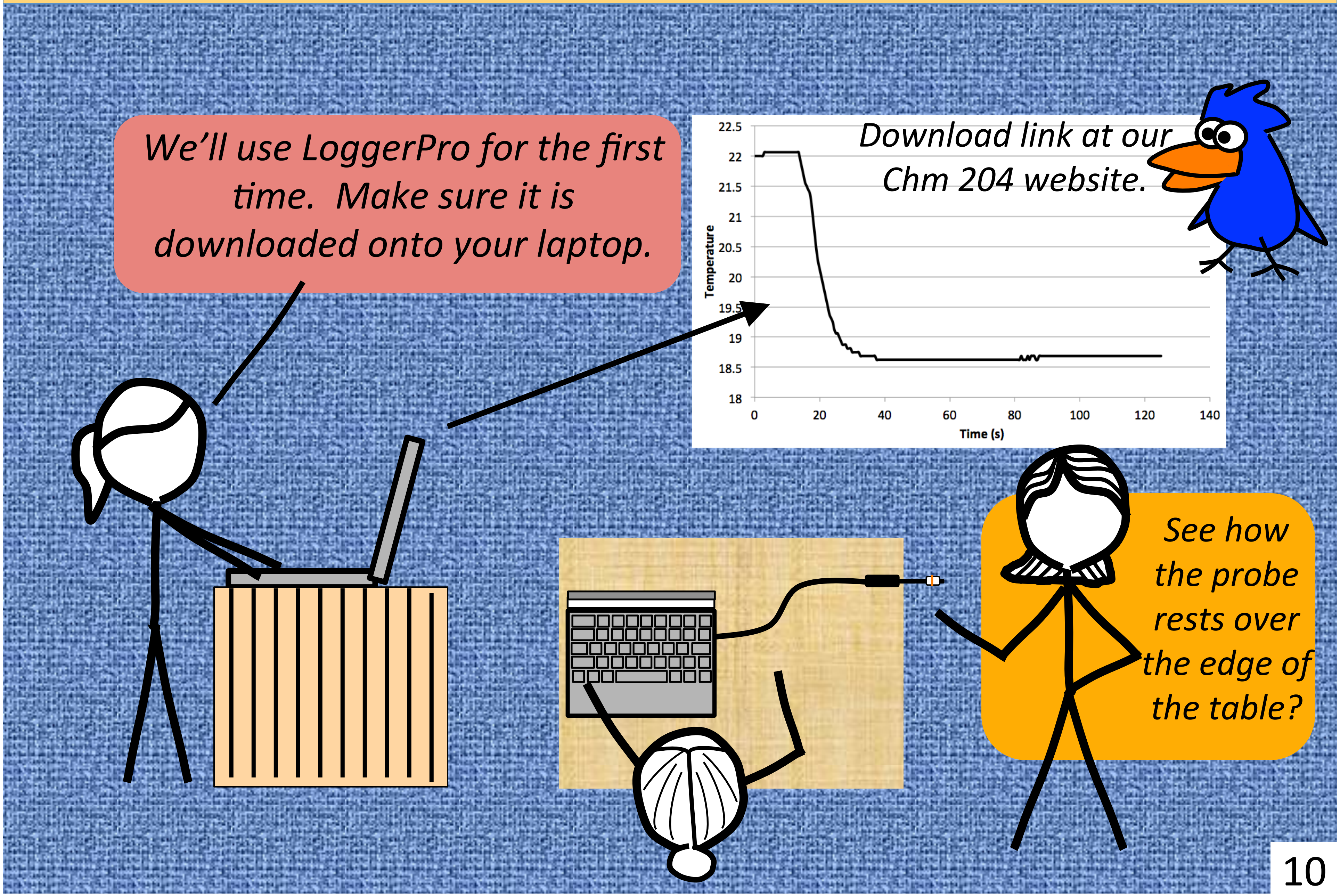
Here are the molecules we are studying today.

Soooo, let's complete this last column together…

Molecule	Formula	MM (g/mol)	IMF?
water	H_2O	18	LDF + H-bonding
ethanol	C_2H_5OH	46	
hexane	C_6H_{14}	86	
pentane	C_5H_{12}	72	
pentanol	$C_5H_{11}OH$	88	
methanol	CH_3OH	32	



3. Procedure: Using LoggerPro



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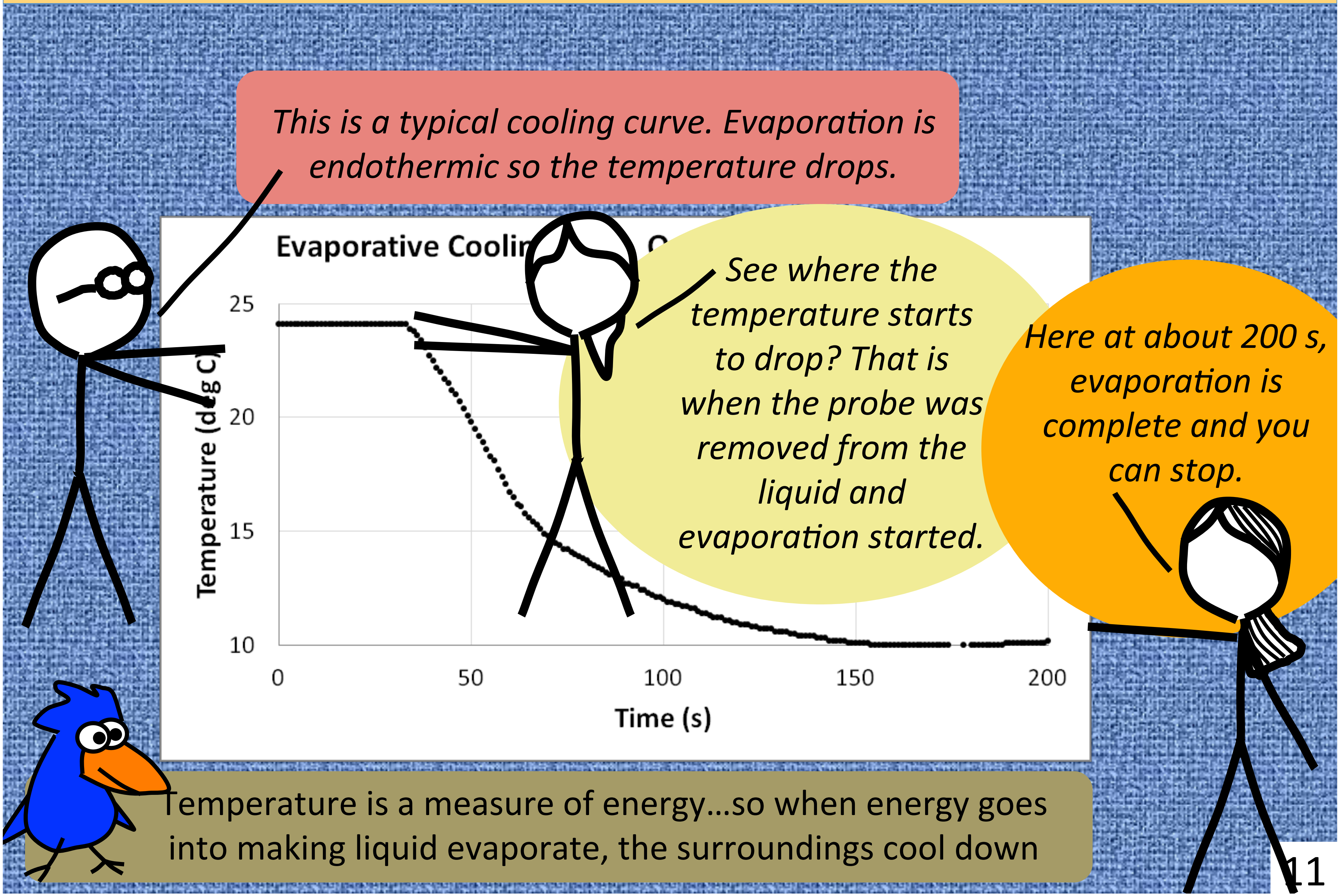
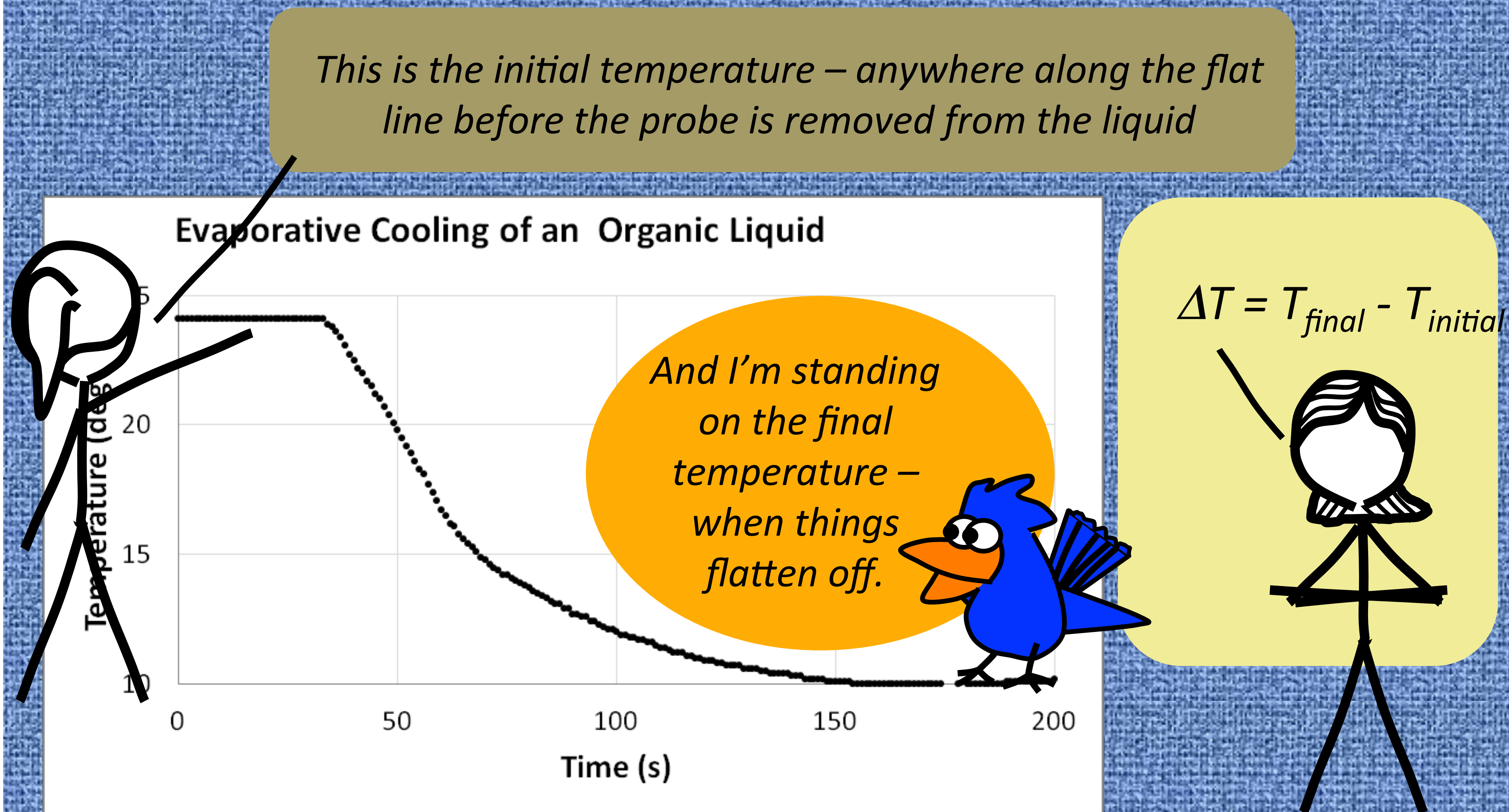
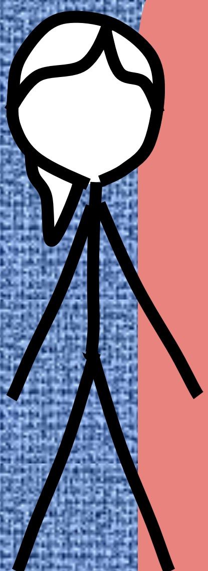


3. Procedure: Using LoggerPro



4. Procedure: What to do today



I. Wear your safety glasses today.

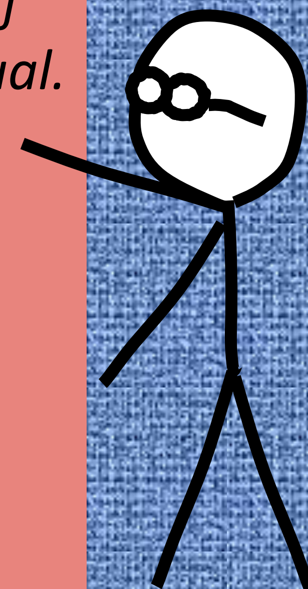
II. We follow the manual carefully – except each pair of us will only do three and water is not listed in manual.

III. You and your partner will do three solvents and the other people at your station will do the other three. The two sets are:

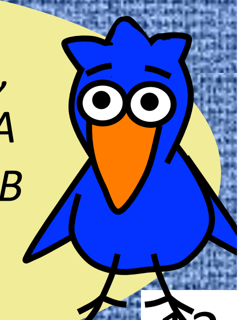
Group A. Water, ethanol, hexane

Group B. Pentane, pentanol, methanol

IV. Record observations and details as carefully as possible.



If you are at Station 1A, 2A, etc., you do Group A solvents. Stations 1B, 2B and so on do Group B solvents.



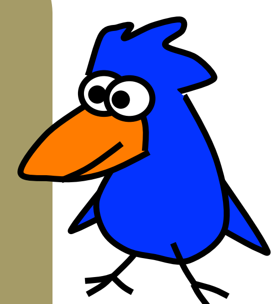
Stick people inspired by xkcd cartoons by Randall Munroe (www.xkcd.com)

5. Your lab report

1. First, the cover page with TA initials.
2. Next, the trimmed copy pages from your lab notebook stapled together.
3. **On-line results** due at the end of class today. . Late submissions are not graded – see the syllabus.
4. Turn in lab report ***today*** or ***before*** the start of class tomorrow. Late labs may not be graded – see the syllabus.

LoggerPro will be used for the last two labs.

Also, dress for a mess – both weeks!



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