Marcet Boiler Rig Experiment

Aim: Demonstrate the thermodynamic basic principal of vapour pressure and temperature during a phase change.

What you need to do:

1. View the "Marcet Boiler Rig Overview" Video. This video describes the operation of the whole rig and all its parts. It explains the evaporation of vapour from water and the condensation back to the water when it cannot escape from the chamber. The relationship between pressure and temperature in a phase change is discussed.
2. View the "Marcet Boiler Experiment Calculation" Video. This video goes through the calculations needed for this experiment using a sample set of results.
3. Your submission:
    a) Beside your name is your assigned Experiment Data #1, #2 or #3. You must use your assigned data. All the work must be your own.
    b) Complete the calculations for your Experiment Data #. Clearly show your work, calculations, steps and graphs used. The usual formality of the laboratory report is not necessary for the video experiments.
    c) Plainly compare your results in relation to the steam tables value and clarify if the results were comparable. Were there any parts of the results that did not match the steam table calculated values? If there were, can you explain what has occurred?
    d) Answer the following questions:
        a. Entropy (s) is a partial derivative with both dv and dT terms. But in this particular experiment some magic occurs that allows us manage entropy (s) as a full derivative of dv? Explain what the magic is.
        b. Steam has the ability to transfer six times the amount of energy when compared to the same bore (Diameter) of pipe containing water. It's used for heating buildings, chemical processes and power generation. But if we are to keep using it we need to eliminate our need on fossil fuels to produce it. Explain a process on how steam could be produced commercially without using any fossil fuels?
        c. In the calculations we use the "latent Heat" of steam. Explain the difference between latent heat and sensible heat and why did we use latent heat in our calculations.

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Marcet Boiler Rig Experiment #1

Results	Pressure (Gauge) Bar	Temperature oC
	0	100
	0.5	106.2
	1	115.3
	1.5	123
	2	129.4
	2.5	134.9
	3	139.6
	3.5	144.2
	4	147.8
	4.5	152
	5	155
	6	161.3
	7	167.2
	8	171.7
	9	176.2
	10	180.5

Environmental Conditions:	Index	Units	Values
Room Temp:	Te	oC	19
Barometer Pressure	Pe	mmHg	745

Marcet Boiler Rig Experiment #2

Results	Pressure (Gauge) Bar	Temperature oC
	0	99.8
	0.5	108.7
	1	118
	1.5	124.5
	2	130.9
	2.5	135.9
	3	140.2
	3.5	144.8
	4	148.7
	4.5	152.7
	5	155.4
	6	161.5
	7	166.8
	8	171.7
	9	176.3
	10	180.3

Environmental Conditions:	Index	Units	Values
Room Temp:	Te	oC	18.5
Barometer Pressure	Pe	mmHg	751

Marcet Boiler Rig Experiment

Marcet Boiler Rig Experiment #3

Results	Pressure (Gauge) Bar	Temperature oC
	0	100
	0.5	106.5
	1	115.3
	1.5	123.2
	2	129.2
	2.5	135
	3	139.3
	3.5	143.9
	4	147.8
	4.5	151.5
	5	154.8
	6	160.6
	7	166.2
	8	171.1
	9	175.9
	10	179.8

Environmental Conditions:	Index	Units	Values
Room Temp:	Te	oC	18
Barometer Pressure	Pe	mmHg	749