

Student Name: _____

Partner Name: _____

Lab Date:

Nov. _____, 2017

Soil pH Report 2017

Objectives of this report.

**10 Marks
Objectives & Lab
Results**

Personal Lab Results

Site: _____

pH in H₂O: _____

Horizon: _____

pH in CaCl₂: _____

** Please attach pH table of class results*

PRINCIPLES behind methods used to determine soil pH.

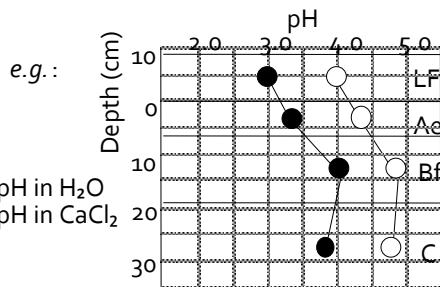
Do NOT just repeat methods section!

**10 Marks
Principles &
Diagram**

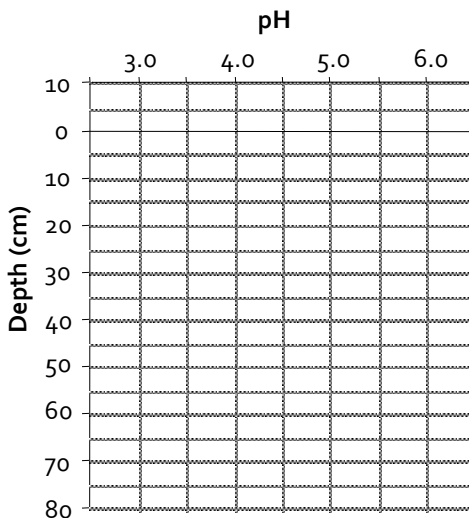
Theoretical / Apparatus Diagram

Results-pH Graphs

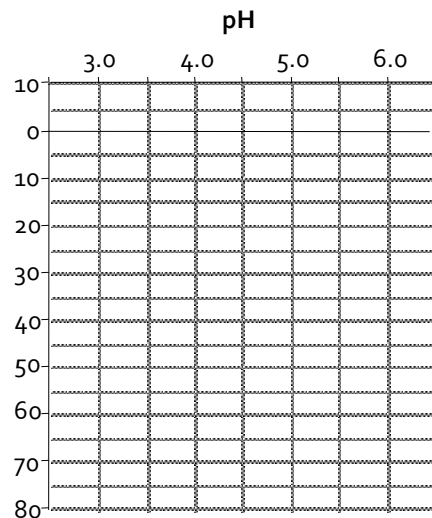
Draw in straight lines where the horizon boundaries occur (see data above for representative thicknesses of horizons sampled) and label them. Plot pH (both in H₂O and in CaCl₂) values at the **mid-point*** of each horizon depth. Use the symbols in the following example for all your graphs.



* Plot values for C horizons 10 cm below boundary.

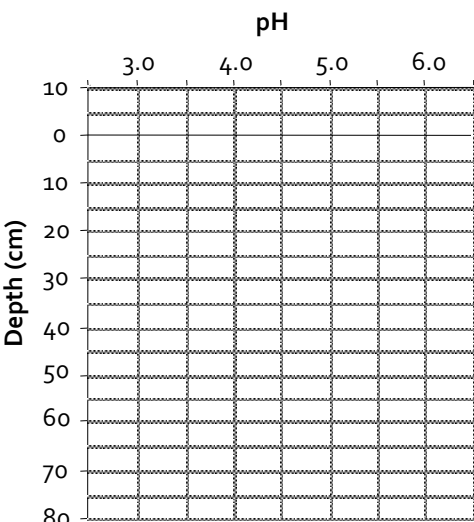


Site 1 – Woodlot RP Plantation

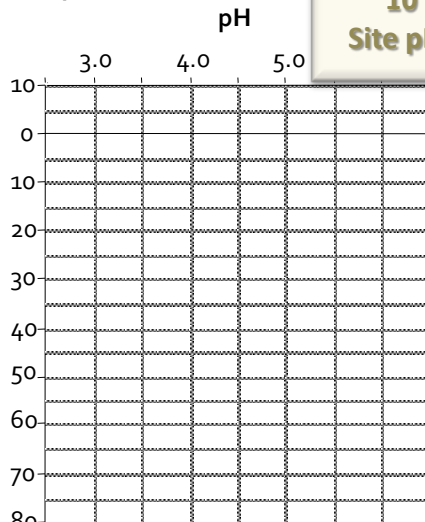


Site 2 – Odell Mixedwood

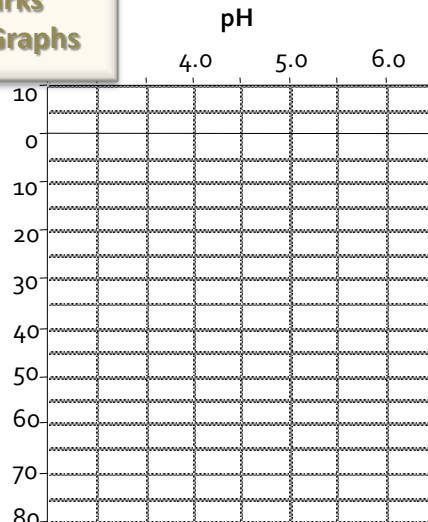
10 Marks
Site pH Graphs



Site 3 – Currie Mountain Basalt



Site 4 – Killarney Lake Esker



Site 5 – Sunset Dr. EWP PLT

Determine which soil layers have the lowest and highest pH values - Use Cacl₂ Readings & Rank Them...

Highest: Site / Horz. / pH : _____

Lowest: Site / Horz. / pH : _____

Any observable trends in the pH ranking?

Likely reasons for soil acidity levels?

10 Marks
pH Ranking & Questions

State your overall conclusions about soil acidity at each site visited. *How does soil pH relate to soil parent material (PM), vegetation type, position in the landscape, and related soil formation processes?*

Site 1 – UNB Woodlot Red Pine Plantation On Glacial Till (GS & RS derived)

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10 Marks
Overall Site
Conclusions

Site 2 – Odell Park - Glacial Till & Colluvium - TH / IH Mixedwood Overstory

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Site 3 – Currie Mountain – Igneous Basalt With Colluvium & Red Siltstone Till

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Site 4 – Killarney Lake – Glacial Esker Deposit

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Site 5 – Sunset Drive – White Pine Plantation On Deep, Sandy Glaciofluvial / Alluvial Terrace

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Answer these 6 general questions regarding soil pH.

Soil pH values tend to increase with soil depth. Why?

Saturated soils will have a lower or higher pH than upland soils?

With a change in forest cover from coniferous to deciduous...how would soil pH change and why?

Which soil parent material will produce the highest pH values underneath forest cover? Why?

**30 Marks
pH Questions**

Would the pH of the forest floor increase or decrease after forest fires? Why?

If you ground a rock, made a slurry of the material, and tested for pH, would the slurry be acidic, neutral, or basic? Why?

Draw and label a single, two-dimensional picture (i.e. geological cross section) that shows the distribution of : the soil parent materials (various types) including bedrock, soil layers by landscape position, the gradation in terms of soil pH, other site Variations (vegetation, slope, drainage, mottling, coarse fragments, rooting, etc.)

20 Marks
pH Landscape
Drawing



The pH meter measures the concentration of hydrogen ions (H⁺) in an aqueous solution that are responsible of its ACIDITY or ALKALINITY. It's formed, in its simplest and most used version, by the so-called GLASS ELECTRODE, a tube made by a special semi-porous glass containing an HCl solution with a known and constant concentration (better named as ACTIVITY) of H⁺ and a silver (Ag) probe covered by AgCl (silver chloride) immersed in it, to keep constant the H⁺ and Cl⁻ activities in this solution.

Just few mm outside this glass tube, there's another Ag probe, equally immersed in the solution to be measured for its H⁺ activity and linked with another .Ag/AgCl glass electrode that is the reference, with a constant electric potential. The porous glass of the electrode prevents the H⁺ ions to diffuse from both sides, but allows the exchange of Na⁺ ions (contained in the silicates of the glass) with the external solution, for keeping the continuity of this electrical system. The H⁺ activity difference between the solution inside the electrode and the external one is measured as electric potential difference, then, converted in pH units (0-14) by the instrument.

This electrode is small, also few cm long, easy and fast to use and sensible (+/- 0.001 pH units) and the relation between the potential measured and the H⁺ activity (a) is expressed by the NERNST EQUATION, very important in chemistry, where E is the electric potential (electrode/solution):

$$E = 0.059 \log [a_0(\text{H}^+) / a_1(\text{H}^+)]$$

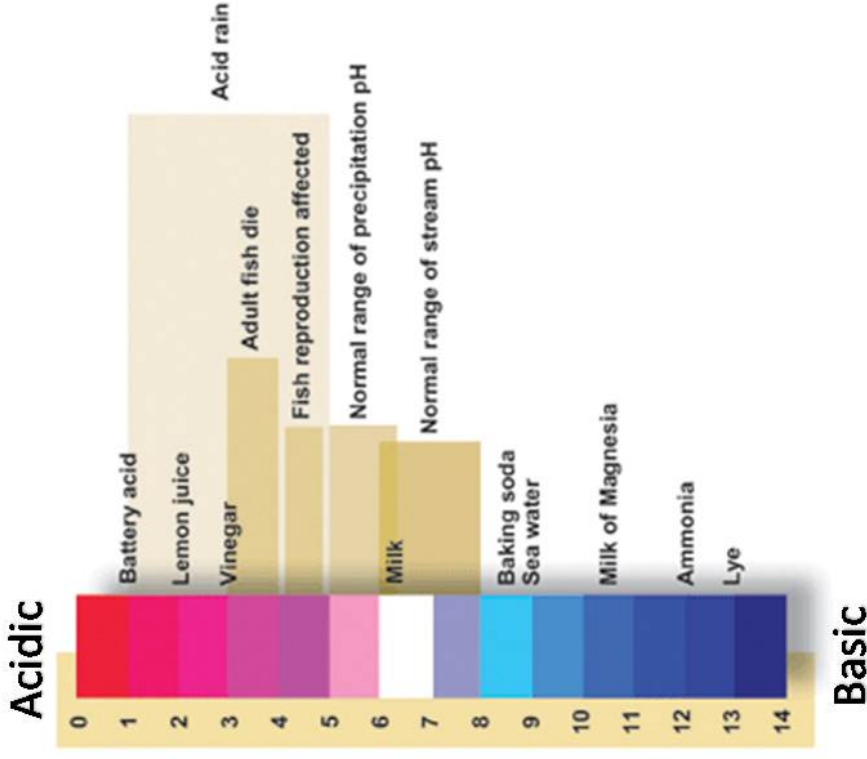
where a₀(H⁺) is the activity of H⁺ inside the electrode, constant and =1, while a₁(H⁺) is the unknown activity of the solution to be measured.

So, the formula becomes:

$$E = 0.059 [1 / a_1(\text{H}^+)]$$

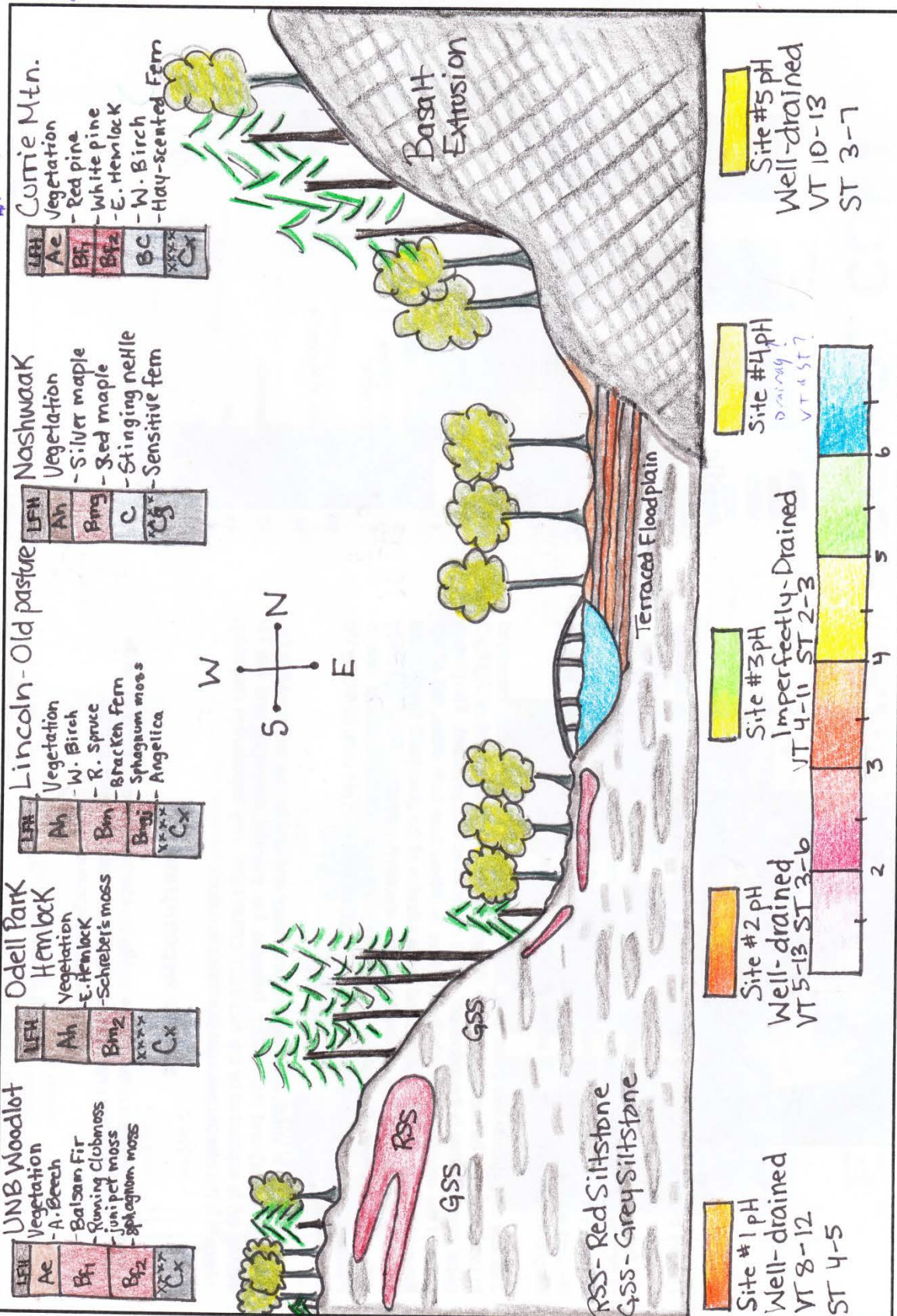
but, following the definition of pH (pH = log 1 / a(H⁺)), this formula is simply:

$$E = 0.059 \text{ pH then, } \text{pH} = E / 0.059$$



Draw and label a single, two-dimensional picture (i.e. geological cross section) that shows the distribution of: the soil parent materials (various types) including bedrock, soil layers by landscape position, the gradation in terms of soil pH, other site Variations (vegetation, slope, drainage, mottling, coarse fragments, rooting, etc.)

Overall, Excellent detail but should related the pH ranges directly to the horizons



some rough scale would be nice

EXAMPLE DIAGRAM - DO NOT COPY