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# Tutorial 13 – Ternary Diagrams

Ternary Diagrams (or Triangular Diagrams) are a way of displaying compositional data, when the data have (or have been chosen to have) precisely three components. Commonly in geological analysis, three components are chosen and the data normalised to these three. Hence, for example, it is common to plot the relative abundance of Quartz, Clasts and Feldspar, relative to the total amount of just these three components, even though these three do not account for all material constituting the rock.

N.B. PETROG is used for petrographic analysis by specialists in different fields: carbonate and clastic sedimentary petrography, coal and coke analysis, igneous and metamorphic rock analyses, etc. The default ternary diagram is different for each specialist. PETROG picks up its default categories, before a [scheme](#) has been chosen, from the entries in the Derived Items table: the first three entries, with IDs 1, 2 & 3, are used for the end-points of the ternary diagram in the absence of any overrides set by the user.

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## Main Menu

The main menu within the Triangular Diagram section of PETROG is:

- File
  - Refresh
  - Print
  - Exit
- View
  - Select Samples
  - Specify Component
    - Vertex A
    - Vertex B
    - Vertex C
  - Select Analysis
    - Any
    - Quantitative Only
    - Estimation Only
- Format
  - Grid
    - no grid

- Grid at 10% intervals
- Grid at 20% intervals
- Grid at 25% intervals
- Grid at 50% intervals
- Point Symbols
  - Size varies with proportion
  - Constant size
- Colours
- Schemes
  - Select Scheme
  - Import New Scheme
- Help

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## File

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## View

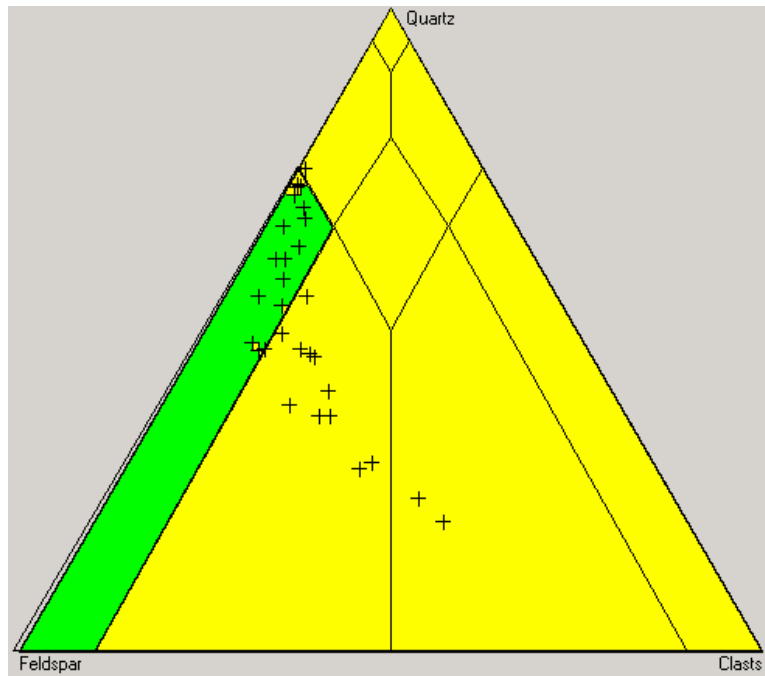
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## Format

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## Schemes

The purpose of plotting ternary diagrams is generally classification. Having plotted the relative abundances, we can overlay a grid or pattern and classify each sample according to the grid cell or pattern area in which it occurs. These overlays are usually named after the paper in which they were first described. Hence, the overlay:



is called the McBride scheme. The samples falling in the green area are categorised as Arkose.

Each ternary scheme is stored in the PETROG database, as:

- A name for the scheme
- A list of three components, the end-points (Quartz, Clasts and Feldspar in the example above), these being PETROG Compound Items and hence can be any combination of any items in the PETROG dictionaries;
- A set of regions (polygons) subdividing the triangle, each defined as a set of corner points, which in turn are given as three numbers, the percentages of each component at that polygon corner point. (In the example above, there are 8 categories (polygons)).

An installation of PETROG has some common schemes pre-defined, but any scheme can be imported by simply defining the components as Compound Items (see Tutorial on Compound Items) and then specifying the polygonal regions (see below: Importing a Ternary Scheme).

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## Selecting a Scheme

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An installation of PETROG has some common schemes pre-defined, but any scheme can be imported by simply defining the components as Compound Items (see Tutorial on Compound Items) and then specifying the polygonal regions (see below: Importing a Ternary Scheme).

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## Importing a Scheme

To import a scheme, i.e. add a new ternary scheme to the PETROG database:

1. Use Excel as an editor to create a file

Put the scheme name in cell A1 and then use one row for each classification (polygonal area within the triangle), with, for each row:  
column 1: classification name;

columns 2+: the coordinates of each corner of the area, as a sequence of three numbers separated by tildes (please do not use commas because coordinates can be real numbers and comma can be confused with the decimal separator). The file for the example above would be:

McBride				
Quartz	Clasts	Feldspar		
Quartz	100~0~0	95~5~0	90~5~5	95~0~5
SubArkose	95~0~5	90~5~5	50~25~25	75~0~25
Sublithic arenite	90~5~5	95~5~0	75~25~0	50~25~25
Arkosic Arenite	75~0~25	50~25~25	0~50~50	0~0~100
Lithic Arenite	50~25~25	75~25~0	0~100~0	0~50~50

i.e. in this scheme, Quartz is classified as anything with a composition falling in the range defined by the quadrilateral: (100% Quartz), (95% Quartz, 5% Clasts), (90% Quartz, 5% Clasts, 5% Feldspar), (95% Quartz, 5% Feldspar) in Quartz-Clasts-Feldspar space.

2. Save the file

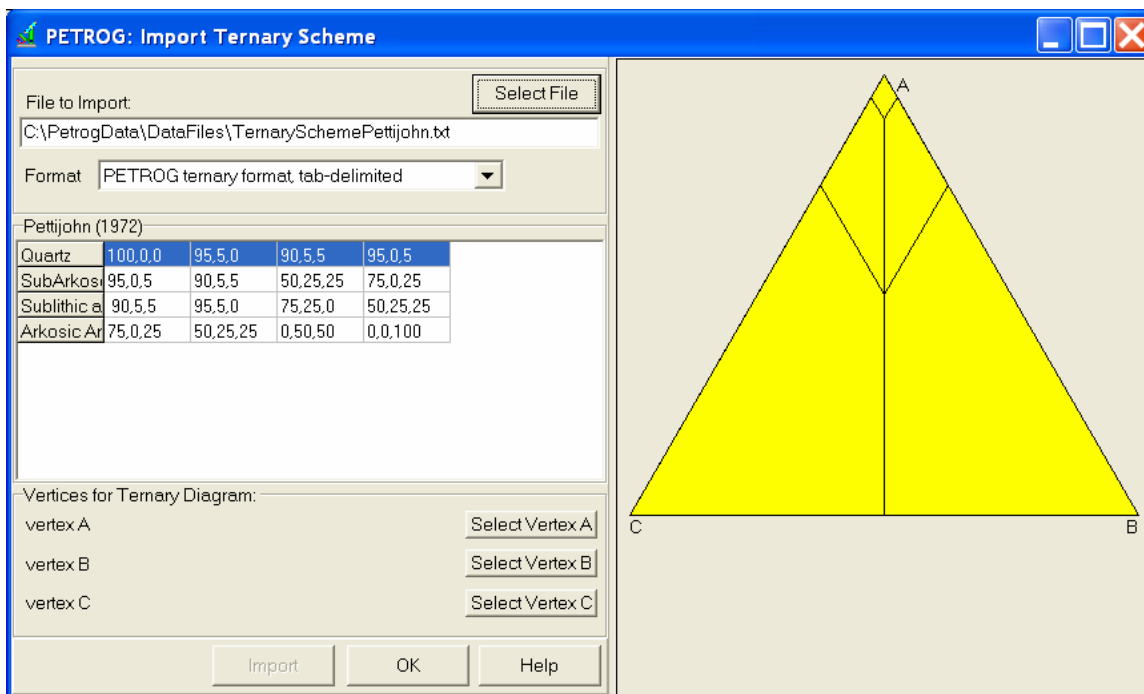
Export this data to a file as text, tab-delimited.

3. Import the file into PETROG

Use menu

Schemes | Import New Scheme

to import the file and set the components. Note that the file format does not include the components. This is because they must be Compound Items already defined in PETROG, so they are specified by choosing from the available Compound Items. So, having imported the file (provided it is in the correct format), the Import window will now look like this:



If the Next, the Vertices (Components) must be selected, using in turn each of the three buttons:

**Select Vertex A**

**Select Vertex B**

**Select Vertex C**

Each of these buttons displays the Select Compound Item window. If the item you want is not in the list displayed, you can create a new one using the button **Create New** in this window (see Tutorial Compound Items for more information).

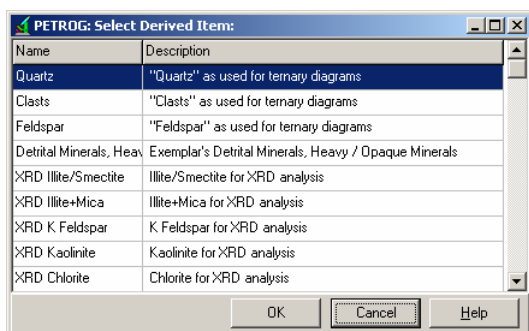
Now pressing the button **Import** saves this scheme in the database, where anyone may use it.

### ***Selecting End-Point Components for a Triangular Diagram***

To select the data to be plotted on the triangular diagram:

Select from the Triangular Diagram window, View | Specify Component | [vertex to be defined].

This will open the Select Derived Item window.



Select Compound Item window.

From this window select the Compound Item that is required as the end member for plotting at the chosen triangular diagram vertex. This selection should be repeated for each vertex as appropriate.

See also Triangular Diagrams in the **PETROG** manual