

Geochemistry Diagram Generator Web Tool v1.0

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Geochemistry Diagram Generator v 1.0

Arizona Geological Survey | Major Element Classification Diagrams

Select Diagram

TAS Volcanic **TAS Plutonic**

AFM K2O-SiO2

Upload Data

Add Sample Series
Upload CSV or Excel (.xlsx) files with geochemistry data

Choose File...

Download Template CSV

Sample Series

Visibility is per-diagram

Show All Hide All Export CSV Clear Uploaded

Plutonic Examples 21

Volcanic Examples N/A 28

TAS Diagram (Plutonic Rocks)

Middlemost (1994)

SVG PNG

The TAS Diagram (Plutonic Rocks) is a scatter plot with Na2O + K2O (wt%) on the y-axis (0 to 16) and SiO2 (wt%) on the x-axis (40 to 85). The plot is divided into several fields representing different rock types: Peridot-gabbro, Alkalic Gabbro, Subalkalic Gabbro, Monzo-gabbro, Fold Gabbro, Foldolite, Fold Monzo-diorite, Monzo-diorite, Gabbro-diorite, Diorite, Monzonite, Fold Monzo-syenite, Syenite, Fold Syenite, Quartz Monzonite, Granite, and Granodiorite. Numerous dark blue square data points are plotted, representing 'Plutonic Examples'. A legend at the bottom indicates that these dark blue squares represent 'Plutonic Examples'.

Screen capture of the Geochemistry Diagram Generator landing page. QR code links to the Geochemistry Diagram Generator website.



INTRODUCTION

The [Geochemistry Diagram Generator](#) is a web-based tool that automatically generates major oxide geochemistry diagrams symbolized by data series and assigns sample classification lithologies or categories, based on user input data. This tool was created to simplify the process of plotting and analyzing major oxide geochemistry data, and to create stylistically similar diagrams for presentations or publications.

METHODS

Tool Development

This tool was developed using Claude Anthropic's AI assistant. The development process involved prompting Claude to generate HTML, React, and JavaScript code based on user-provided data and specifications. Features such as data input handling, data plotting, and export functionality were progressively added using a conversational approach. This method was also used for debugging and refining the code. The GitHub platform was used for project management and software versioning. The entire codebase for the project is publicly available through GitHub under a MIT open-source license. Users may suggest future enhancements or bug issues for the tool as issues through GitHub.

Website Configuration

The website interface was designed based on the [University of Arizona Brand Guidelines](#) to create a clear and functional layout. Claude was used to develop this interface, with an emphasis on ease of use. The tool was prepared to be hosted as part of a [site](#) designed to provide accessible geologic tools. The site was deployed on an Amazon Web Services instance under the University of Arizona's Campus Cloud Infrastructure program.

TOOL FUNCTIONALITY

The Geochemistry Diagram Generator is a user-friendly browser-based application that plots major oxide geochemical data in four diagram types with parameters set from established literature: Total alkali versus silica (TAS) volcanic (LeBas et al., 1986, with reference lines from Irvine and Baragar, 1971)(Fig. 1A); TAS plutonic (Middlemost, 1994)(Fig. 1B); Alkali-iron-magnesium ternary (Rollinson, 1996)(Fig. 1C); and K₂O versus silica (Peccerillo and Taylor, 1976 with reference lines from Ewart, 1982; Rickwood, 1989)(Fig. 1D).

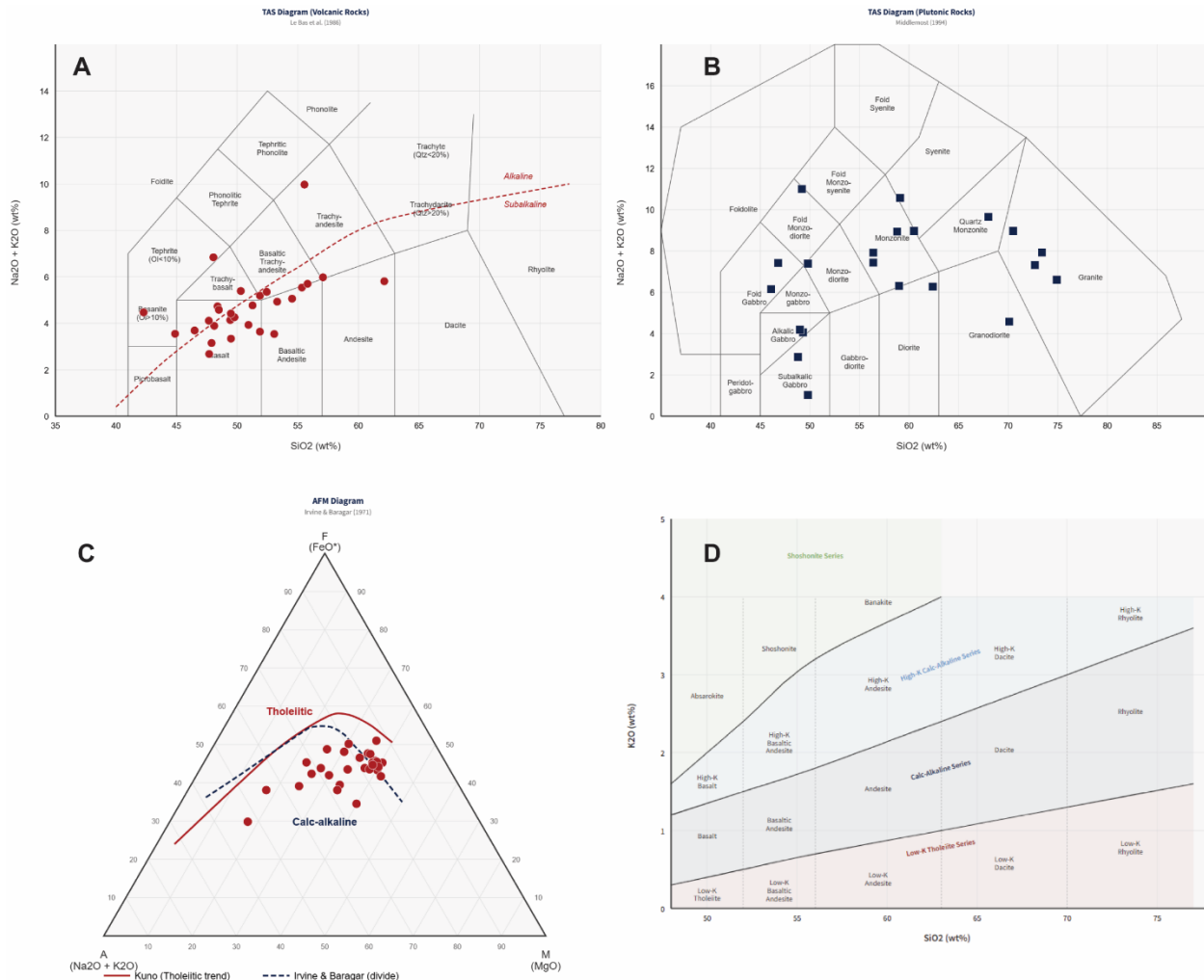


Figure 1: A) TAS diagram for volcanic rocks; B) TAS diagram for plutonic rocks; C) AFM diagram for volcanic rocks; D) K₂O vs. silica diagram for basalts-andesites

Users can upload their own major oxide data using the template provided (Fig. 2), and the tool will automatically plot that data on one or more diagrams of interest. The template is organized such that sample data are categorized in a series, e.g. ‘volcanic’ or ‘plutonic’. The data series is useful because it will divide related sample points into datasets with differing symbology. Data point symbols and color are customizable for each dataset, and multiple sample series can be plotted at once. All rendered diagrams are available for download as PNG or SVG files.

A	B	C	D	E	F	G	H	I	J	K	L	M
Series	Sample	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅
My Series	SAMPLE-001	50.5	1.2	16	10.5	0	0.15	6.5	9	3	1	0.4
My Series	SAMPLE-002	48.2	1.5	15.5	11	0	0.18	7.2	9.5	2.8	0.9	0.35

Figure 2: Template .csv file provided for data upload.

For both the TAS volcanic and plutonic diagrams, datasets can be exported as csv files that will include the sample lithologic classification as a field column (Fig. 3).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Series	Sample	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	TAS_Volcanic		
Volcanic Examples	BS01f	50.93	1.39	16.49	11.24	0	0.17	6.11	10.08	2.86	1.07	0.39	Basalt		
Volcanic Examples	BS02f	44.88	2.74	11.79	10.39	0	0.33	8.68	10.09	2.88	0.67	0.86	Basanite/Tephrite		
Volcanic Examples	AM01f	51.88	1.84	18.04	11.21	0	0.15	5.4	9.06	3.74	1.45	0.69	Basaltic Trachyandesite		

Figure 3: Exported .csv file from the TAS volcanic diagram, showing sample lithologic classification in column N.

For the AFM diagram, datasets can be exported as csv files that will include the magma type classification (Fig. 4)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Series	Sample	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	AFM	
Volcanic Examples	BS01f	50.93	1.39	16.49	11.24	0	0.17	6.11	10.08	2.86	1.07	0.39	Calc-alkaline	
Volcanic Examples	BS02f	44.88	2.74	11.79	10.39	0	0.33	8.68	10.09	2.88	0.67	0.86	Tholeiitic	
Volcanic Examples	AM01f	51.88	1.84	18.04	11.21	0	0.15	5.4	9.06	3.74	1.45	0.69	Calc-alkaline	

Figure 4: Exported .csv file from the AFM diagram showing magma type classification in column N.

The K₂O vs. silica diagram is designed to only plot basaltic to andesitic rocks with silica greater than 48 weight percent. Like the other diagrams, datasets can be exported as csv files that assign rock lithology (Fig. 5).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Series	Sample	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	K2O_SiO2		
Volcanic Examples	DV01f	62.14	0.95	15.48	5.57	0	0.1	2.33	4.28	3.92	1.89	0.3	Andesite		
Volcanic Examples	IP09f	55.34	1.02	17.02	9.05	0	0.13	6.94	8.75	3.39	2.15	0.42	High-K Basaltic Andesite		
Volcanic Examples	IP10f	50.3	1.38	16.13	8.63	0	0.14	3.97	10.91	3.7	1.69	0.56	High-K Basalt		

Figure 5: Exported .csv file from the K₂O vs. silica diagram showing sample lithologic classification in column N.

USE OF AI DECLARATION

Claude AI was used to develop this tool, from initial concept through final implementation. Beginning with how a web tool could integrate geochemistry templates and data. Features were progressively added through an iterative, conversational process. University of Arizona Brand Guidelines were provided to stylize the interface.

RECOMMENDED CITATION

Figures generated using this web tool for publications, presentations, websites, or other media should cite this publication:

Zaitlin, L.R., and Thompson, L.A., 2026, Geochemistry Diagram Generator Web Tool v1.0. <https://tools.azgs.arizona.edu/geochem/geochem.html>

REFERENCES

- Ewart, A., 1982, The mineralogy and petrology of Tertiary-Recent orogenic volcanic rocks: with special reference to the andesitic-basaltic compositional range: *in*, Thorpe, R., ed., *Andesites: Orogenic Andesites and Related Rocks*, v. 7, p. 25-98.
- Irvine, T.N. and Baragar, W.R.A., 1971, A Guide to the Chemical Classification of the Common Volcanic Rocks. *Canadian Journal of Earth Science*, v. 8, p. 523-548.
- Kuno, H., 1968, Differentiation of Basalt Magmas: *in*, Hess, H.H. and Poldervaart, A., eds., *Basalts: The Poldervaart Treatise on Rocks of Basaltic Composition*, v.2, p. 623–688.
- Le Bas, M.J., Le Maitre, R.W., Streckeisen, A. and Zanettin, B., 1986, A Chemical Classification of Volcanic Rocks Based on the Total Alkali-Silica Diagram. *Journal of Petrology*, v. 27, p. 745-750.
- Peccerillo, A., and Taylor, S. R., 1976, Geochemistry of Eocene calc-alkaline volcanic rocks from the Kastamonu area, Northern Turkey. *Contributions to Mineralogy and Petrology* v. 58, p. 63–81.
- Rickwood, P. C. (1989) Boundary lines within petrologic diagrams which use oxides of major and minor elements. *Lithos* 22, p. 247–263.
- Rollinson, H., 1996, *Using Geochemical Data*. Addison Wesley Longman, Harlow, Essex, 352 pp.