

# MSI

Science Simplified



## MSI EUREKA | User Guide

Data categories in MSI Eureka

Download & Installation

How to activate a license

How to get to documents

Useful links

# Data Categories

## ► **Compilations:**

- Links to Literature – bibliography on materials constitution
- Research Results – extended extracts from original articles
- Diagrams as Published (Reference Diagrams) – collection of phase diagrams

## ► **Evaluations**

- Ternary System Reports – critically evaluated 3-component systems
- Binary System Reports - critically evaluated 2-component systems
- p-T-x System Reports - evaluated pressure/ temperature data for 2-component systems

# Phase Diagram Compilations

## ▶ Links to Literature

- ▶ bibliographic data base with **274.852** entries
- ▶ on all inorganic materials ever published, **>51.000** systems: unary, binary, ternary, multinary

## ▶ Research Results

- ▶ **4288** extended extracts from the literature - all sorted after materials systems.
- ▶ Each document reports data on one materials system only.
- ▶ The information is presented as published, i.e. not validated in the light of other data known, contrary to the binary and ternary MSIT Evaluations.

## ▶ Diagrams as Published (Reference Diagrams)

- ▶ phase diagram collections for reference, uniformly edited, as published in the original publications, but not evaluated by MSIT.
- ▶ **~1800** diagrams for **1530** binary and ternary systems

## Phase Diagram Evaluations (1)

- ▶ Ternary Evaluation Reports (~4000 systems)
- ▶ Binary Evaluation Reports (155 systems)
- ▶ p-T-x Binary Evaluations (188 systems)
  - ▶ provide the intellectual critical evaluation of all published data and facts on each individual materials system.
  - ▶ Each evaluation report is a concise, consistent and - as far as published data allow- comprehensive description of individual binary or ternary system.
  - ▶ the often conflicting data are critically evaluated by experts in materials science and reviewed under the authority of the MSIT Program Board.

## Phase Diagram Evaluations (2)

Phase diagrams are already conclusions from many different observations.

Therefore, critical evaluation of the phase diagrams means to go back to the original data.

- ▶ conflicts within the published data are pointed out, settled wherever possible and the arguments for rejecting, amending or accepting data are given.
- ▶ conclusions are drawn from many different articles. MSI Evaluation Reports do not speculate, but stick to the facts.
- ▶ conflicting diagrams are discussed in the evaluation report and one diagram is selected or generated. Decisions are justified in the text.
- ▶ new diagrams are drawn from that data that appear to be reliable.
- ▶ System Report is made internally consistent and consistent with the accepted edge binary systems
- ▶ Validated data, the rules of heterogeneous equilibria, thermodynamic validation + the competence of the author lead to new value added information.

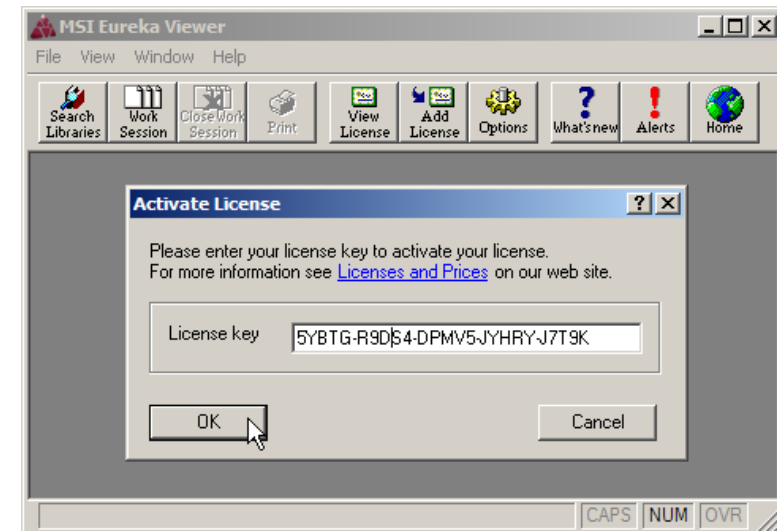
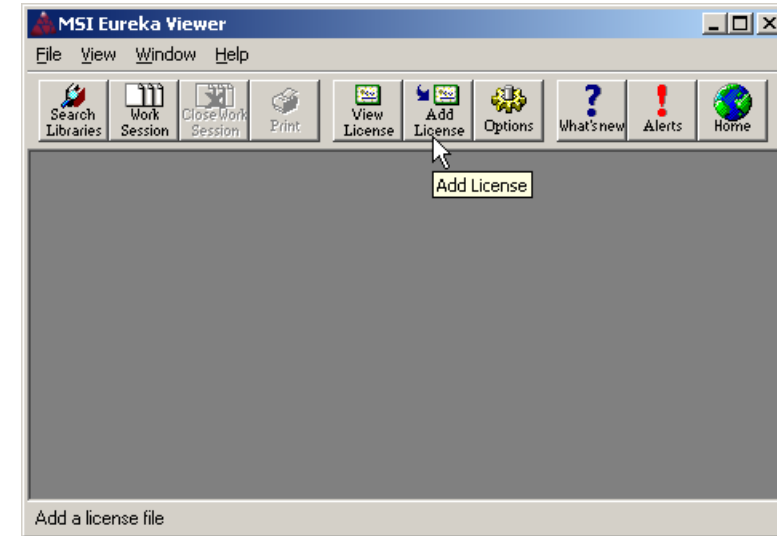
## Download & Installation

- ▶ Download and open the installation file (“MSIViewer5xx.exe”, size approx. 7 MB)
- ▶ After opening the installation file, a setup wizard will guide you through the software setup.
- ▶ After the setup is completed you may start MSI Eureka Viewer from the Windows Start menu.

## How to activate a license

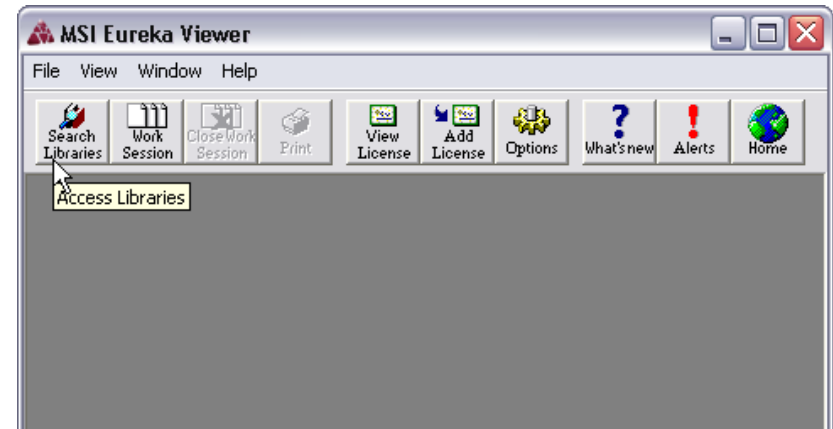
- ▶ First click the *Add License* button
- ▶ Then copy/paste your license key into the *Activate License* box.

**Where is the license key coming from?** License keys are disseminated by the office that arranged the subscription (trial) for your organization. Normally this is your **library**.

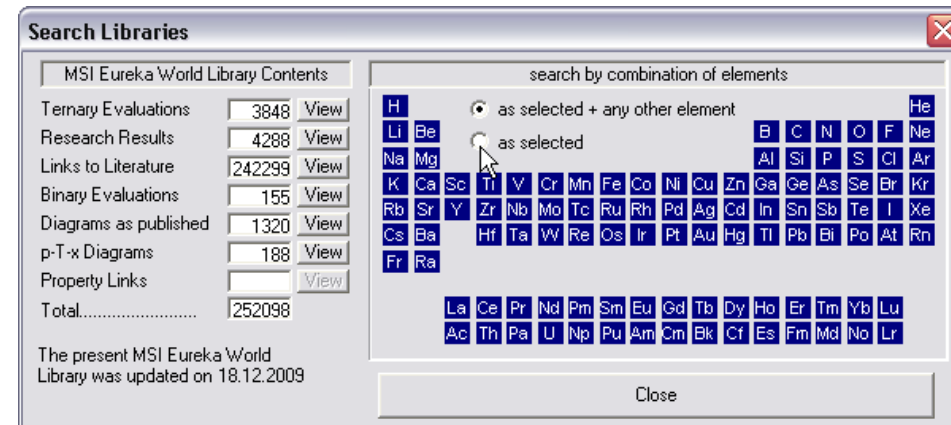


## Steps 1 & 2 let you select the documents:

1. After you activated your license, click on "Search Libraries" button to open the periodic table.

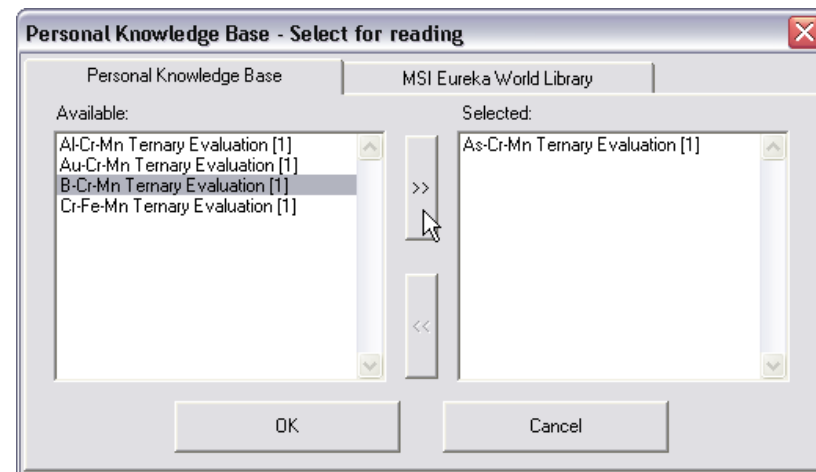


2. In the periodic table:
  - ▶ Select the element combination
  - ▶ Set the selection mode (e.g. "as selected + any other element")
  - ▶ Click on a "View" button to select documents per category (e.g. Ternary Evaluations).

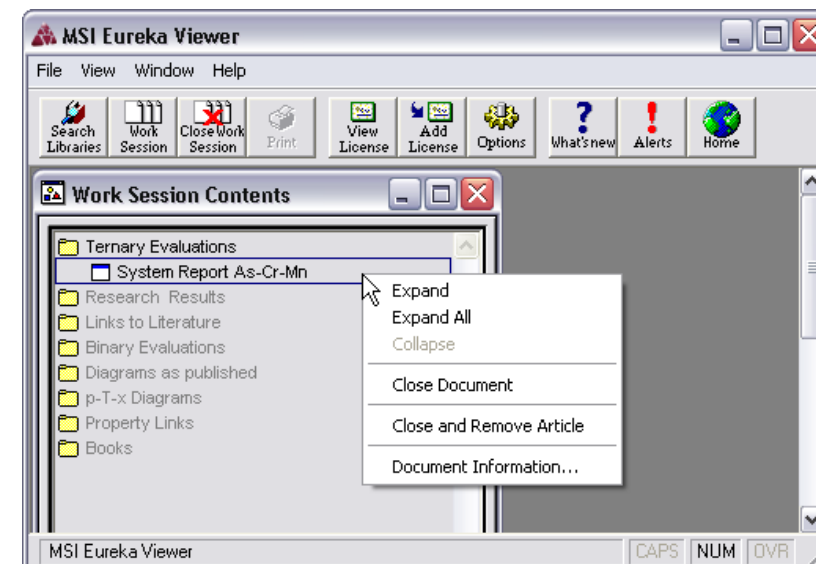


## Steps 3 & 4 let you view the documents

- All documents covered by your license are in your Personal Knowledge Base.
  - To compile a Work Session move the documents from the "Available" box (left side) to the "Selected" box (right side).
  - Click "OK" and "Download".

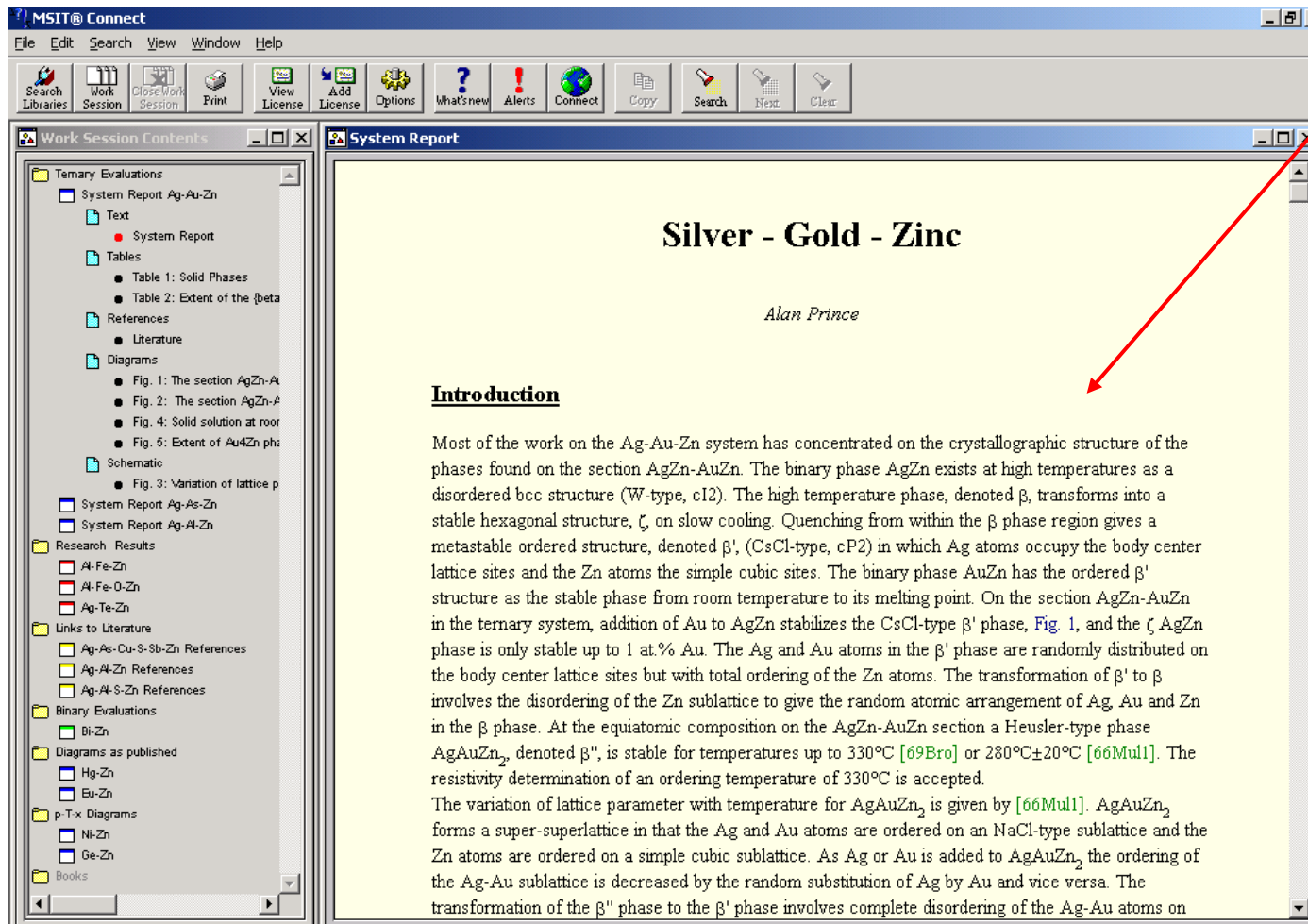


- Close the periodic table. A right mouse click opens documents in the window "Work Session Contents".



# Selected functionalities of MSI Eureka

## What does a System Report look like?



The screenshot shows the MSI Eureka software interface. The main window displays a System Report titled "Silver - Gold - Zinc" by Alan Prince. The report content is as follows:

### Silver - Gold - Zinc

Alan Prince

#### Introduction

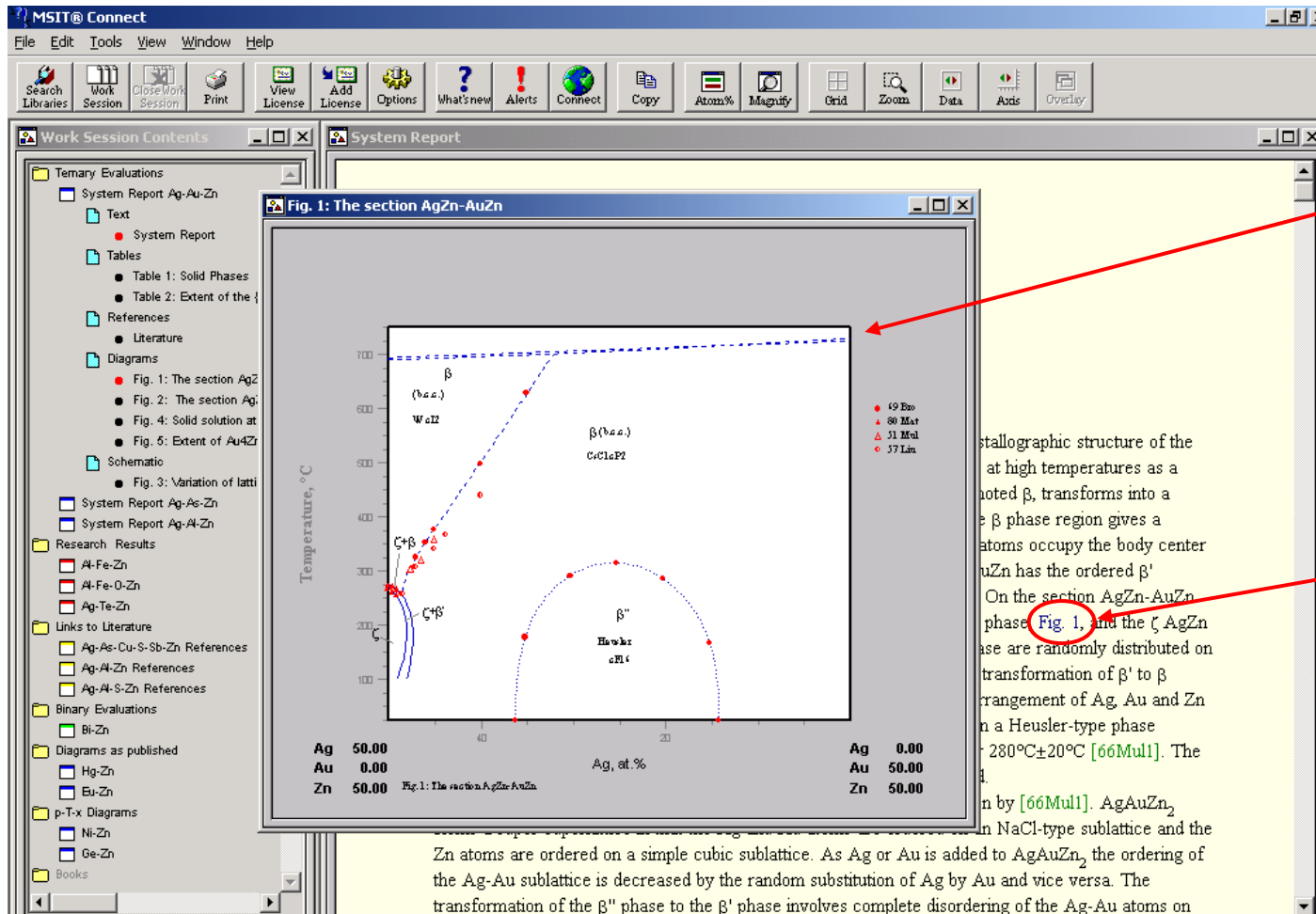
Most of the work on the Ag-Au-Zn system has concentrated on the crystallographic structure of the phases found on the section AgZn-AuZn. The binary phase AgZn exists at high temperatures as a disordered bcc structure (W-type, cI2). The high temperature phase, denoted  $\beta$ , transforms into a stable hexagonal structure,  $\zeta$ , on slow cooling. Quenching from within the  $\beta$  phase region gives a metastable ordered structure, denoted  $\beta'$ , (CsCl-type, cP2) in which Ag atoms occupy the body center lattice sites and the Zn atoms the simple cubic sites. The binary phase AuZn has the ordered  $\beta'$  structure as the stable phase from room temperature to its melting point. On the section AgZn-AuZn in the ternary system, addition of Au to AgZn stabilizes the CsCl-type  $\beta'$  phase, Fig. 1, and the  $\zeta$  AgZn phase is only stable up to 1 at.% Au. The Ag and Au atoms in the  $\beta'$  phase are randomly distributed on the body center lattice sites but with total ordering of the Zn atoms. The transformation of  $\beta'$  to  $\beta$  involves the disordering of the Zn sublattice to give the random atomic arrangement of Ag, Au and Zn in the  $\beta$  phase. At the equiatomic composition on the AgZn-AuZn section a Heusler-type phase  $\text{AgAuZn}_2$ , denoted  $\beta''$ , is stable for temperatures up to 330°C [69Bro] or 280°C±20°C [66Mul1]. The resistivity determination of an ordering temperature of 330°C is accepted. The variation of lattice parameter with temperature for  $\text{AgAuZn}_2$  is given by [66Mul1].  $\text{AgAuZn}_2$  forms a super-superlattice in that the Ag and Au atoms are ordered on a NaCl-type sublattice and the Zn atoms are ordered on a simple cubic sublattice. As Ag or Au is added to  $\text{AgAuZn}_2$  the ordering of the Ag-Au sublattice is decreased by the random substitution of Ag by Au and vice versa. The transformation of the  $\beta''$  phase to the  $\beta'$  phase involves complete disordering of the Ag-Au atoms on

### Descriptive Text

The text part of the System Report is an interactive document. Here the user finds explanations why, e.g. after critical review of ALL data, phase diagrams in the System Report may differ from those published earlier.

# Selected functionalities of MSI Eureka

## Link from System Report to related data

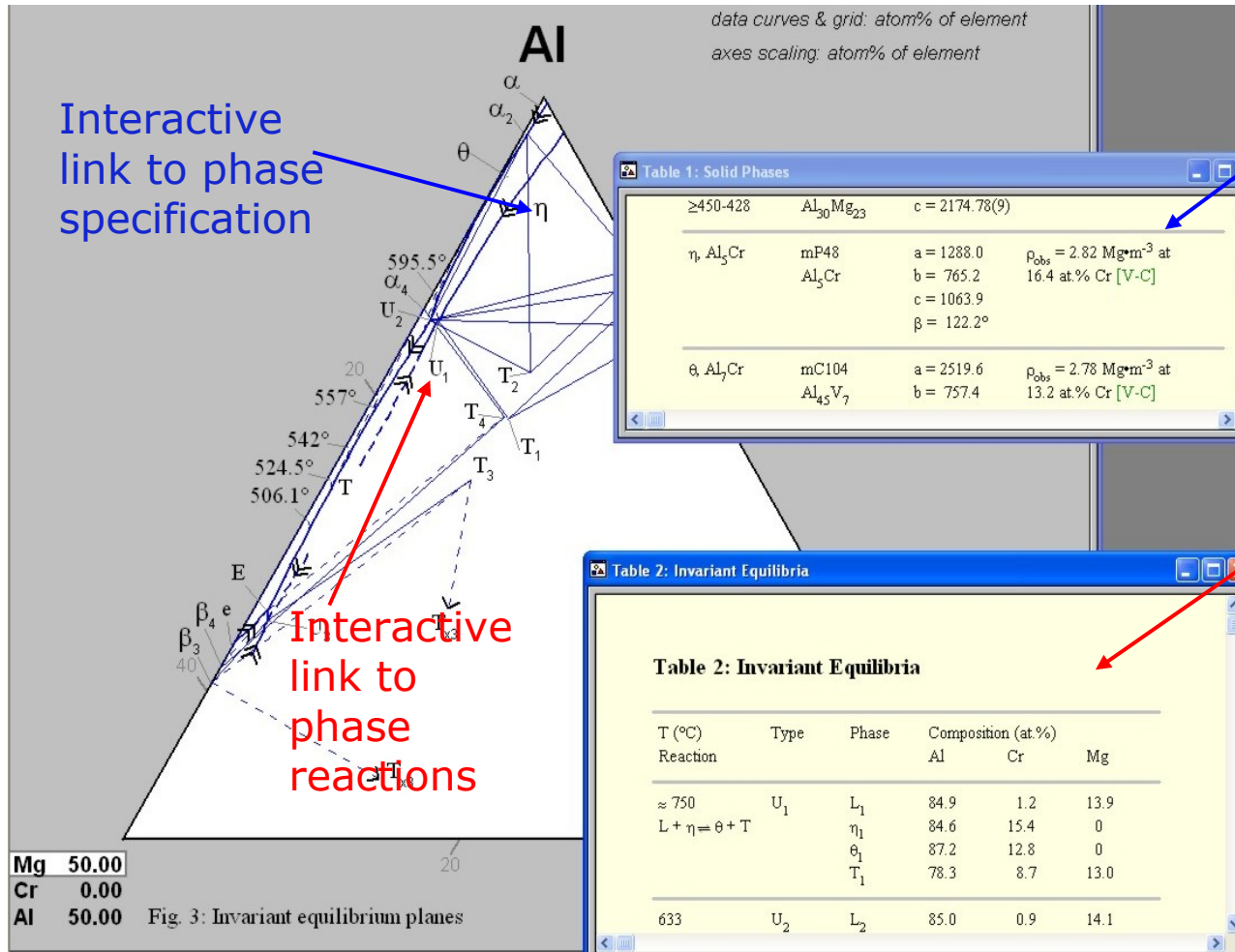


Related diagram data

Interactive link

# Selected functionalities of MSI Eureka

## Link from Diagrams to tabulated data

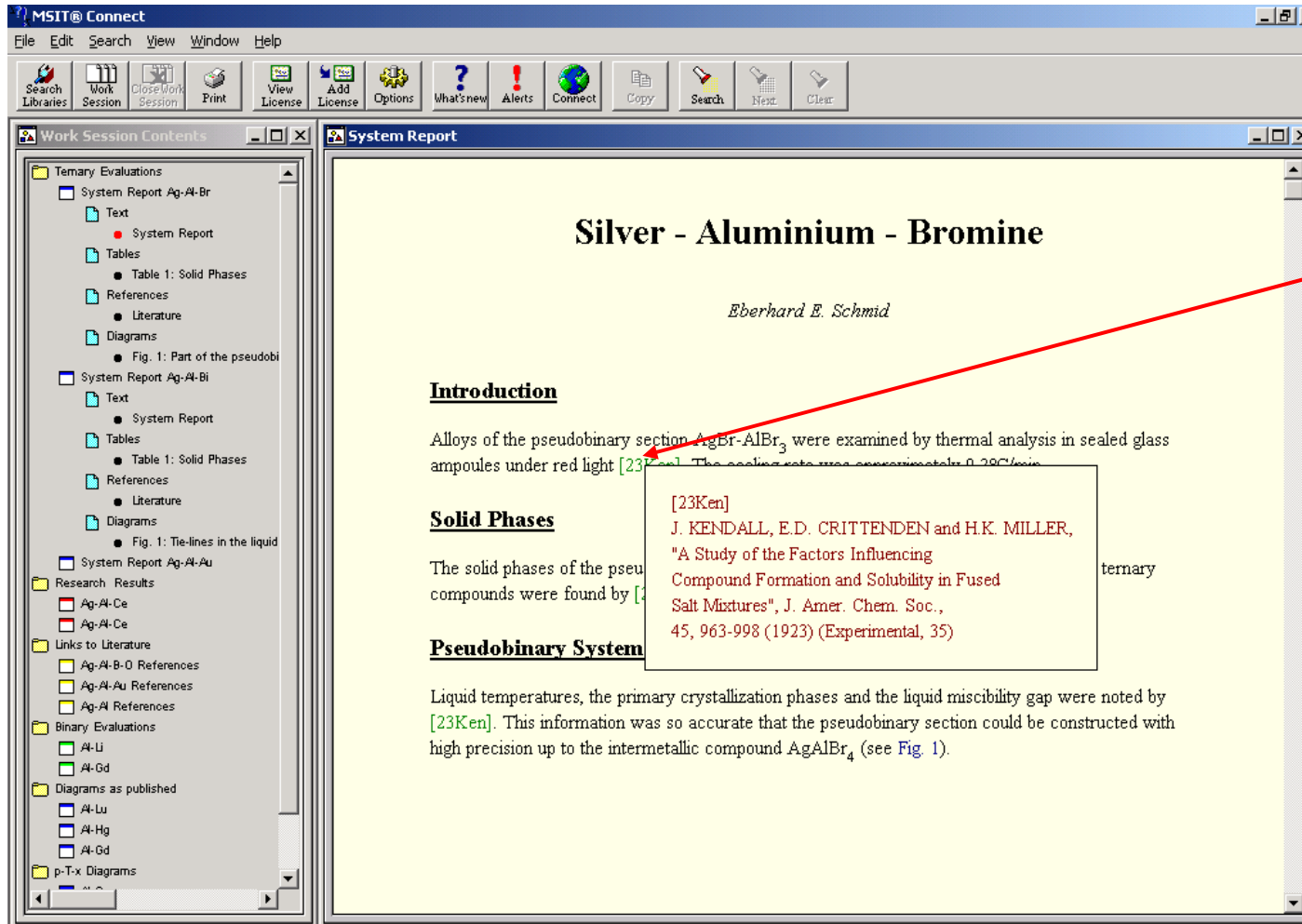


Related tables describe the type of phase structure, lattice parameters, stability range,....

Related tables describe which phases take part in the reaction, form or disappear with changing temperature? When and how they do this, and what is the element concentration in each phase.

# Selected functionalities of MSI Eureka

## Link to bibliographic information



**Silver - Aluminium - Bromine**

*Eberhard E. Schmid*

**Introduction**

Alloys of the pseudobinary section  $\text{AgBr-AlBr}_3$  were examined by thermal analysis in sealed glass ampoules under red light [23Ken]. The cooling rate was approximately  $0.28^\circ\text{C}/\text{min}$ .

**Solid Phases**

The solid phases of the pseudobinary system were found by [23Ken].

**Pseudobinary System**

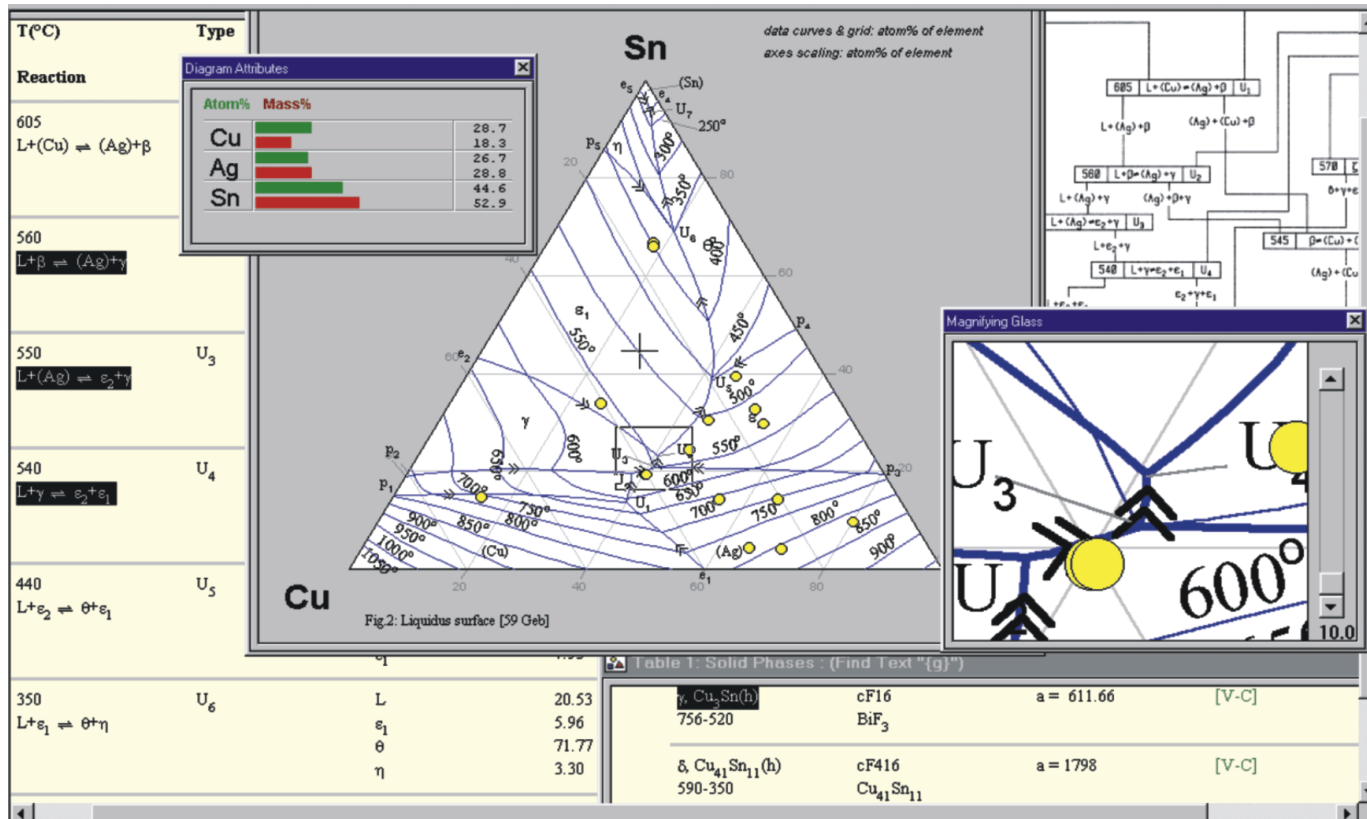
Liquid temperatures, the primary crystallization phases and the liquid miscibility gap were noted by [23Ken]. This information was so accurate that the pseudobinary section could be constructed with high precision up to the intermetallic compound  $\text{AgAlBr}_4$  (see Fig. 1).

[23Ken]  
J. KENDALL, E.D. CRITTENDEN and H.K. MILLER,  
"A Study of the Factors Influencing  
Compound Formation and Solubility in Fused  
Salt Mixtures", J. Amer. Chem. Soc.,  
45, 963-998 (1923) (Experimental, 35)

Click on  
references to  
view full  
bibliographic  
information

# Selected functionalities of MSI Eureka

## Navigate interactive documents



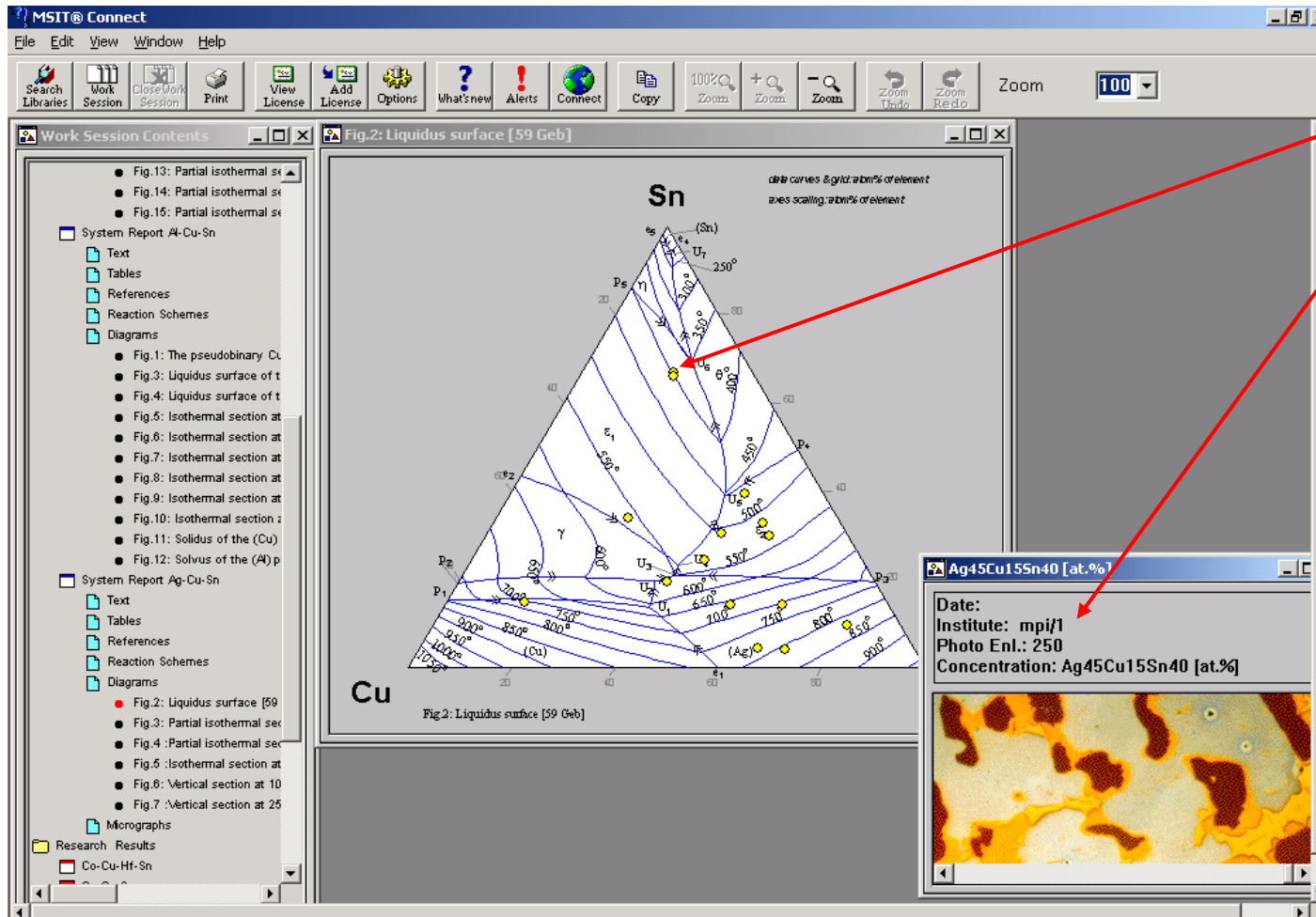
Manipulate phase diagrams

search tables

find your answers quickly

# Selected functionalities of MSI Eureka

## Link to micrographs from phase diagrams



Click on yellow dots to view micrographs (where available)

[Click here to watch a tutorial video](#)

[Click here to read about  
Information Products in MSI Eureka](#)

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