Category	Approach	Molecules	Reactions	Dynamics	Papers
Rewriting systems	**Chemical Abstract Machine (CHAM)**	terms of an algebra	transformation laws	parallel	Berry & Boudol
	Chemical Rewriting System on Multisets (ARMS)	abstract symbols	rewriting rules	rule application	Suzuki & Tanaka
	Chemical Casting Model (CCM)	atoms & links	reaction rules	local evaluation function	Kanada
	Lambda Calculus (AlChemy)	Lambda expressions	collision rules	rule application	Fontana & Buss
Arithmetic Operations	**Simple Arithmetic Operators**	natural numbers	integer addition operations	well stirred tank reactor	
	Matrix-Multiplication Chemistry	binary strings	matrix algebra	implicit/explicit	Banzhaf
Autocatalytic Polymer Chemistries		character sequences	concatenation/cleavage		Bagley, Farmer, Fontana, Kauffman
Abstract Automata		strings of symbols	running the machine	no explicit dynamics	Laing
Artificial Molecular Machines	**Polymers as Turing Machines**	linear polymers	binding dynamics	2D domain	McCaskill
	Machine-Tape Interaction	tapes & machines	tape —> machine reaction	rate equations	Ikegami & Hashimoto
	Automata Reaction	binary strings	finite state automaton	explicit collisions	Dittrich & Banzhaf
Assembler Automata	**Coreworld**	difficult to determine	difficult to determine	parallel execution	Rasmussen
	Tierra	improvement over Coreworld that includes replicators			Ray
	Avida	assembler program	replicators	2D lattice	Adami
Lattice Molecular Systems	**Autopoietic System**	substrate/catalysts/monomers	reaction rules	asynchronous application	Varela, Maturana, Uribe
	Lattice Polymers	focus is on folding processes, not chemical evolution			
	Lattice Molecular Automaton (LMA)	atoms/monomers	none	synchronous update rule	Mayer, Kohler, Rasmussen
	Self-Replicating Cell	symbolic chemicals on a 2D grid & cell-like structures			Ono & Ikegami
Other Approaches	**Mechanical Artificial Chemistry**	physical approach			Hosokawa
	The Chemical Metaphor in Cellular Automata	cellular automata			Sahama
	Typogenetics	very complex, nondeterministic			Hofstadter