

Additional Practice Problems

1. $Cqs \rightarrow ANqs$
2. $Krq \rightarrow NCrNq$
3. $\rightarrow ArNr$
4. $Ksp \rightarrow NANsNp$
5. $NKpq \rightarrow ANpNq$
6. $NCpr \rightarrow KpNr$
7. $NAqs \rightarrow KNqNs$
8. $Eps \rightarrow ENpNs$
9. $Np, Nq \rightarrow Epq$
10. $Epq, Eqr \rightarrow Epr$

Answer Key

No

1)

	Eps, Ns, p \rightarrow Aqr																			
1	Eps	s																		
2	Ns	s																		
3	p	s																		
4	<table style="display: inline-table; border-collapse: collapse; vertical-align: middle;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">a</td> <td style="border-bottom: 1px solid black; padding: 2px 5px;">NAqr</td> <td style="padding: 2px 5px;">s</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">b</td> <td style="padding: 2px 5px;">Eps</td> <td style="padding: 2px 5px;">R 1</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">c</td> <td style="padding: 2px 5px;">Ns</td> <td style="padding: 2px 5px;">R 2</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">d</td> <td style="padding: 2px 5px;">p</td> <td style="padding: 2px 5px;">R 3</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">e</td> <td style="padding: 2px 5px;">Cps</td> <td style="padding: 2px 5px;">Eo b</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">f</td> <td style="padding: 2px 5px;">s</td> <td style="padding: 2px 5px;">Co d,e</td> </tr> </table>	a	NAqr	s	b	Eps	R 1	c	Ns	R 2	d	p	R 3	e	Cps	Eo b	f	s	Co d,e	No 4
a	NAqr	s																		
b	Eps	R 1																		
c	Ns	R 2																		
d	p	R 3																		
e	Cps	Eo b																		
f	s	Co d,e																		
4	Aqr																			

Eps, Ns, p /R, Eo, Co, No

2)

	CApsNr, Kpr \rightarrow NKqq										
1	CApsNr	s									
2	Kpr	s									
3	p	Ko 2									
4	r	Ko 2									
5	Aps	Ai 3									
6	Nr	Co 1,4									
7	<table style="display: inline-table; border-collapse: collapse; vertical-align: middle;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">a</td> <td style="border-bottom: 1px solid black; padding: 2px 5px;">NNKqq</td> <td style="padding: 2px 5px;">s</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">b</td> <td style="padding: 2px 5px;">r</td> <td style="padding: 2px 5px;">R, 4</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">c</td> <td style="padding: 2px 5px;">Nr</td> <td style="padding: 2px 5px;">R, 6</td> </tr> </table>	a	NNKqq	s	b	r	R, 4	c	Nr	R, 6	No 7
a	NNKqq	s									
b	r	R, 4									
c	Nr	R, 6									
8	NKqq										

CApsNr, Kpr /
R, No, Co, Ai, Ko

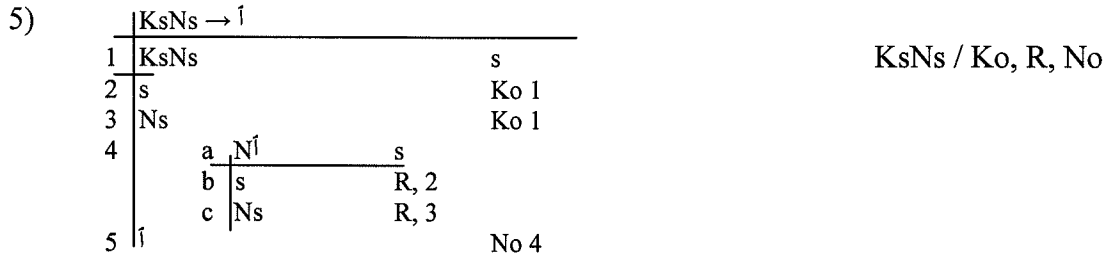
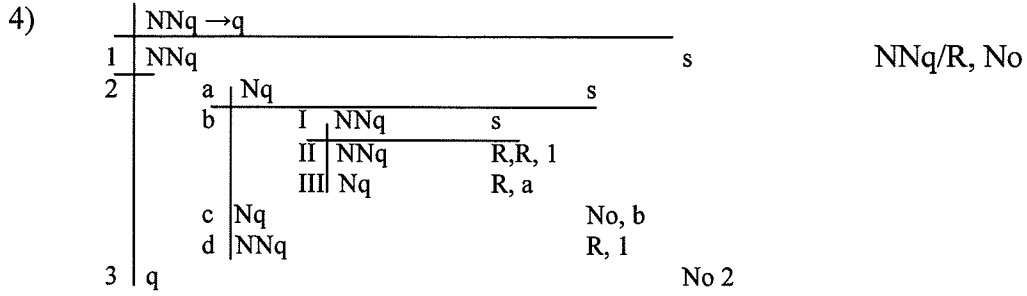
3)

	KKEqrCrNqr \rightarrow Ess										
1	KKEqrCrNqr	s									
2	r	Ko 1									
3	KEqrCrNq	Ko 1									
4	Eqr	Ko 3									
5	CrNq	Ko 3									
6	Nq	Co 2,5									
7	Crq	Eo 4									
8	q	Co 2,7									
9	<table style="display: inline-table; border-collapse: collapse; vertical-align: middle;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">a</td> <td style="border-bottom: 1px solid black; padding: 2px 5px;">NEss</td> <td style="padding: 2px 5px;">s</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">b</td> <td style="padding: 2px 5px;">q</td> <td style="padding: 2px 5px;">R, 8</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">c</td> <td style="padding: 2px 5px;">Nq</td> <td style="padding: 2px 5px;">R, 6</td> </tr> </table>	a	NEss	s	b	q	R, 8	c	Nq	R, 6	No 9
a	NEss	s									
b	q	R, 8									
c	Nq	R, 6									
10	Ess										

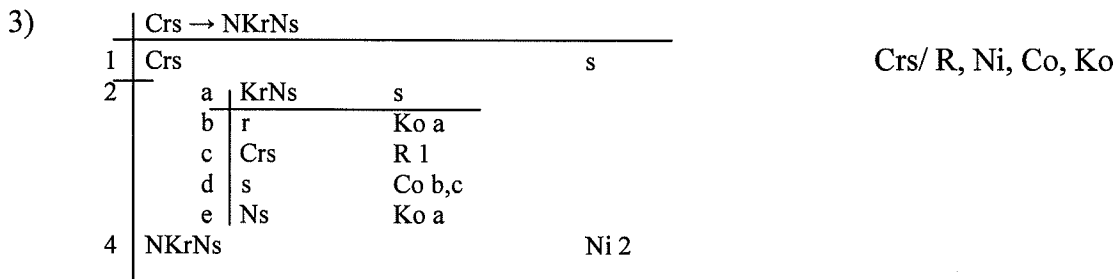
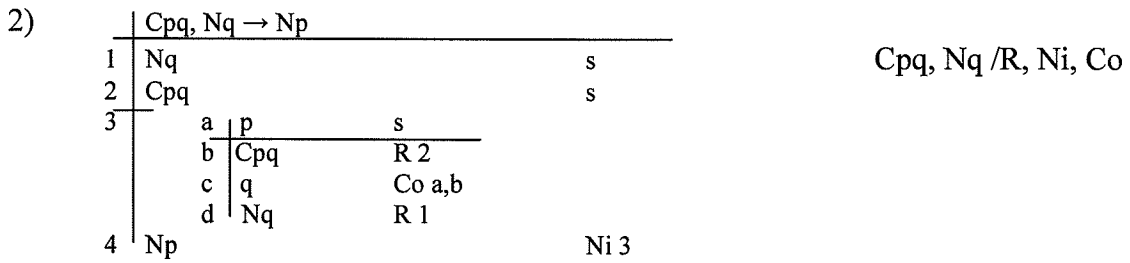
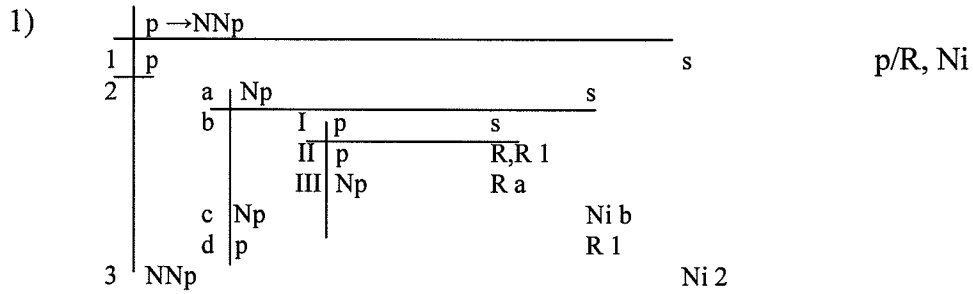
KKEqrCrNqr /
R, No, Co, Eo, Ko

Answer Key

No



Ni



Answer Key

Ni

4)

CqKsNs → Nq	
1	CqKsNs s
2	a q s
	b CqKsNs R 1
	c KsNs Co a,b
	d s Ko c
	e Ns Ko c
3	Nq Ni 2

CqKsNs/
R, Ni, Ko, Co

5)

KqNq → Ní	
1	KsNs s
2	s Ko 1
3	Ns Ko 1
4	a í s
	b s R, 2
	c Ns R, 3
5	Ní Ni 4

KqNq / Ko, R, Ni

Ci

1)

Ksq → Eqs	
1	Ksq s
2	s Ko 1
3	q Ko 1
4	a s s
	b q R 3
5	Csq Ci 4
6	a q s
	b s R 2
7	Cqs Ci 6
8	Eqs Ei 5,7

Ksq/R, Ci, Ei, Ko

2)

→ CqCKrpp	
1	a q s
	b I Krp s
	II p Ko I
2	c CKrpp Ci b
	CqCKrpp Ci 1

/Ko, Ci

3)

Crs → CNsNr	
1	Crs s
2	a Ns s
	b I r s
	II Crs R I
	III s Co I,II
3	c Nr Ni
	CNsNr Ci 2

Crs/ R, Ni, Ci, Co

Answer Key

Ci

4)

NKsr → CsNr			
1	NKsr		s
2	a s		s
	b I r s		
		II s R a	
		III Ksr Ki I,II	
		IV NKsr R,R 1	
	c Nr		Ni a
3	CsNr		Ci 2

5)

r → C'r			
1	r		s
2	a ṙ s		
	b r R, 1		
3	C'r		Ci 2

Ao

1)

Ars, Ns → r			
1	Ars		s
2	Ns		s
3	a r		s
	b I Nr s		
		II A NNr s	
		B Nr R I	
		C r R,R a	
	III Nr		No I
	IV r		R a
	c r		No, b
4	a s		s
	b I Nr s		
		II s R a	
		III NS R,R 2	
	c r		No, b
5	r		Ao 3,4

2)

AErpEpr → KCprCrp			
1	AErpEpr		s
2	a Erp		s
	b Crp		Eo a
	c Cpr		Eo a
	d KCprCrp		Ki b,c
3	a Epr		s
	b Crp		Eo a
	c Cpr		Eo a
	d KCprCrp		Ki b,c
4	KCprCrp		Ao 2,4

Answer Key

Ao

3)

AKsqKqs → Esq		
1	AKsqKqs	s
2	a	Ksq s
	b	s Ko a
	c	q Ko a
	d	I s s II q R c
	e	Csq Ci d
	f	I q s II s R b
	g	Cqs Ci f
	h	Esq Ei e,g
3	a	Kqs s
	b	s Ko a
	c	q Ko a
	d	I s s II q R c
	e	Csq Ci d
	f	I q s II s R b
	g	Cqs Ci f
	h	Esq Ei e,g
4	Esq	Ao 2,3

AKsqKqs /
Ao, Ei, Ci, Ko

4)

Apr → CNpr				
1	Apr	s		
2	a	Np s		
	b	Aps R 1		
	c	I	r s	
			A Nr s	
		II	B Nr s	
			2 Nr R A	
			3 r R,R I	
		C Nr No, B		
		D r R I		
		III	r No, II	
		d	I	p s
				A Nr s
	II		B Np R,R a	
			C p R, I	
III	r No II			
E	r Ao b,c,d			
3	CNpr	Ci 2		

Apr / R, No, Ci, Ao

Answer Key

Ao

5)

Asp → NKNsNp			
1	Asp		s
2	a	KNsNp	s
	b	Np	Ko a
	c	Ns	Ko a
	d	Asp	R 1
	e	I p	s
		II A NNp	s
		B Np	R,R b
		C p	R I
		III p	No II
	f	I s	s
		II A Np	s
		B Ns	R,R c
		C s	R I
		III p	No II
3	g	p	Ao d,e,f
		NKNsNp	No 2

Asp /
Ko, R, No, Ao

Additional Practice Problems

1)

Cqs → ANqs			
1	Cqs		s
2	a	NANqs	s
	b	I Nq	s
		II ANqs	Ai I
		III NANqs	R a
	c	q	No b
	d	Cqs	R 1
	e	s	Co c,d
	f	ANqs	Ai e
	g	I NNANqs	s
		II NANqs	R a
		III ANqs	R f
	h	NANqs	No g
3		ANqs	No, 2

Cqs /
Ai, R, No, Co

2)

Krq → NCrNq			
1	Krq		s
2	r		Ko 1
3	q		Ko 1
4	a	CrNq	s
	b	r	R 2
	c	Nq	Co a,b
	d	q	R 3
5		NCrNq	Ni 4

Krq /
Ko, R, Co, Ni

Answer Key

Additional Practice Problems

3)

		→ ArNr		
1	a	NArNr s		/Ai, No, R
	b	I Nr s		
		II ArNr Ai I		
		III NArNr R a		
	c	r		No b
	d	ArNr		Ai c
	e	I NArNr s		
		II ArNr R d		
		III NArNr R a		
	f	NArNr		No e
2	ArNr			No 1

4)

		Ksp → NANsNp		
1	Ksp	s		Ksp/R, Ko, Ni, Ao
2	a	ANsNp s		
	b	Ksp		R 1
	c	s		Ko b
	d	p		Ko b
	e	I Ns s		
		II A s s		
		B s R,R c		
		C Ns R I		
		III Ns Ni II		
	f	I Np s		
		II A s s		
		B p R,R d		
		C Np R I		
		III Ns Ni II		
	g	Ns		Ao a,e,f
3	NANsNp			Ni 2

5)

		NKpq → ANpNq		
1	NKpq	s		NKpq/R, Ko, No, Ai
2	a	NANpNq s		
	b	I Np s		
		II ANpNq Ai I		
		III NANpNq R a		
	c	p		No b
	d	I Nq s		
		II ANpNq Ai I		
		III NANpNq R a		
	e	q		No d
	f	Kpq		Ko c,e
	g	NKpq		R 1
3	ANpNq			No 2

Answer Key

Additional Practice Problems

6)

		NCpr → KpNr		
1	NCpr			s
2	a	NKpNr		s
	b	I	p	s
		II	A Nr	s
			B p	R I
			C KpNr	Ki A,B
			D NKpNr	R,R a
		III	r	No II
	c	Cpr		Ci b
	d	NCpr		R 1
3	KpNr			No 2

NCpr/R, Ki, No, Ci

7)

		NAqs → KNqNs		
1	NAqs			s
2	a	q		s
	b	Aqs		Ai a
	c	NAqs		R 1
3	Nq			Ni 2
4	a	s		s
	b	Aqs		Ai a
	c	NAqs		R 1
5	Ns			Ni 4
6	KNqNs			Ki 3,5

NAqs/R, Ki, Ni, Ai

8)

		Eps → ENpNs		
1	Eps			s
2	a	Np		s
	b	I	s	s
		II	Eps	R,R 1
		III	Csp	Eo II
		IV	p	Co III
		V	Np	R a
	c	Ns		Ni b
3	CNpNs			Ci 2
4	a	Ns		s
	b	I	p	s
		II	Eps	R,R 1
		III	Cps	Eo II
		IV	s	Co III
		V	Ns	R a
	c	Np		Ni b
5	CNsNp			Ci 4
6	ENpNs			Ei 3,5

Eps/
R, Eo, Co, Ci, Ei, Ni

Answer Key
Additional Practice Problems

9) $Np, Nq \rightarrow Epq$

1	Np		s									
2	Nq		s									
3	a	p	s									
	b	<table border="0"> <tr> <td>I</td> <td>Nq</td> <td>s</td> </tr> <tr> <td>II</td> <td>Np</td> <td>$R, R 1$</td> </tr> <tr> <td>III</td> <td>p</td> <td>$R a$</td> </tr> </table>	I	Nq	s	II	Np	$R, R 1$	III	p	$R a$	
I	Nq	s										
II	Np	$R, R 1$										
III	p	$R a$										
	c	q	$No b$									
4	Cpq		$Ci 3$									
5	a	q	s									
	b	<table border="0"> <tr> <td>I</td> <td>Np</td> <td>s</td> </tr> <tr> <td>II</td> <td>Nq</td> <td>$R, R 2$</td> </tr> <tr> <td>III</td> <td>q</td> <td>$R a$</td> </tr> </table>	I	Np	s	II	Nq	$R, R 2$	III	q	$R a$	
I	Np	s										
II	Nq	$R, R 2$										
III	q	$R a$										
	c	p	$No b$									
6	Cqp		$Ci 5$									
7	Epq		$Ei 4,6$									

$Np, Nq/ R, No, Ci, Ei$

10) $Epq, Eqr \rightarrow Epr$

1	Epq		s
2	Eqr		s
3	a	p	s
	b	Epq	$R 1$
	c	Cpq	$Eo b$
	d	q	$Co a,c$
	e	Eqr	$R 2$
	f	Cqr	$Eo e$
	g	r	$Co d,f$
4	Cpr		$Ci 3$
5	a	r	s
	b	Eqr	$R 2$
	c	Crq	$Eo b$
	d	q	$Co a,c$
	e	Epq	$R 1$
	f	Cqp	$Eo e$
	g	p	$Co d,f$
6	Crp		$Ci 3$
7	Epr		$Ei 4,6$

$Epq, Eqr/$
 R, Eo, Co, Ci, Ei